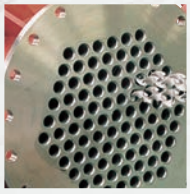
Noritake



STATIC MIXER

SIMPLE & HIGH PERFORMANCE

# STATIC MIXER
# GENERAL CATALOG

This is the entrance to mixing technology.

The Static Mixer is a unique static type mixing unit with no actuator.
At Noritake Company, we incorporate static mixers into a wide range
of mixing applications and work towards revolutionary development of
the mixing process. Our static mixers, with our exclusive mixing functions, have become
invaluable assets and receive high appraisal from our users.
Moreover, we are working to push our static mixers into the next century, by applying
innovation to the creation process of producing high quality products for everyone.

# This is how Mixing Technology works.

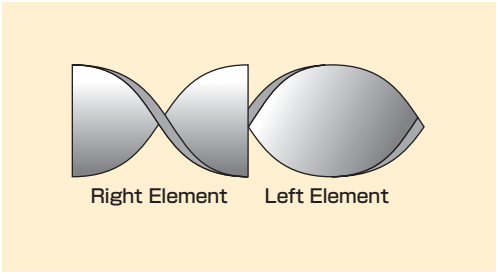
IC MIXER

# Precise mixing technology and superior principles for a future full of possibilities.

The static mixer is a unique standstill type with no actuator.
Liquid that enters the mixer is sequentially mixed and stirred by elements.

## The geometry of Static Mixer Elements.

The element is a rectangular plate that is twisted 180 degrees, creating a right element and a left element, depending on the direction of the twist. The basic length of each element is 1.5 times the diameter.




Characteristics of a Static Mixer

## Characteristics of a Static Mixer

### Simple Construction

◆Consistent Cross-sections
◆No space for fluid buildup.

Merits
- No Pressure loss
- Easy to Upgrade
- Easy to clean

### Inline Construction

◆Shut out from outside air

Merits
- Safe work environment
- Clean operation
- Space saving

### Radial Mixing

◆Nearly Ideal Piston Flow

Merits
- Safer Control Systems
- Continuous & Uniformed Operation
- Easy Expansion

### No Actuator

◆Maintenance Free

Merits
- Nearly no wearing parts.
- Simple Installation.

◆No Power Supply Necessary

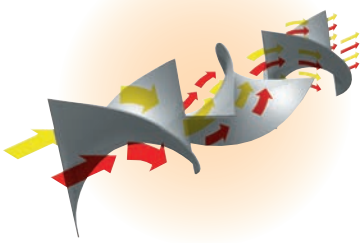
Merits
- Energy Efficient
- Explosion Safe Area installation possible

# Mixing Principles of a Static Mixer

Static Mixers efficiently mix through a process of division, conversion and inversion.

## Division Process

Each time a liquid passes through an element, it is split in half. Number of Separations N=2n.
N: Number of Elements.

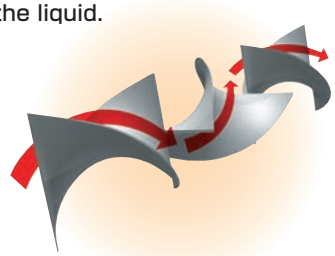


## Conversion Process

The liquid glides along the inner spiral walls of the element, moving from the center part of the cylinder to the walls, and from the walls to the center part, being sorted in the process.

## Inversion Process

The liquids direction of rotation changes in each element, receiving rapid inversion of inertial force, which agitates the liquid.



## Liquid-liquid Mixing

Alkali & acid neutralization

Low viscosity substances with mutual solubility are mostly mixed through the inversion process. You can see that it is sufficiently mixed with relatively few elements.

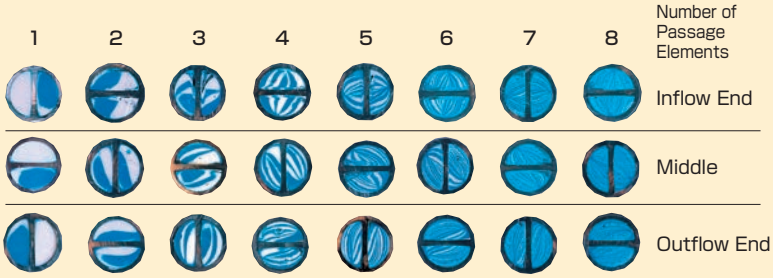
## Liquid-liquid Dispersion

Oil dispersion into water

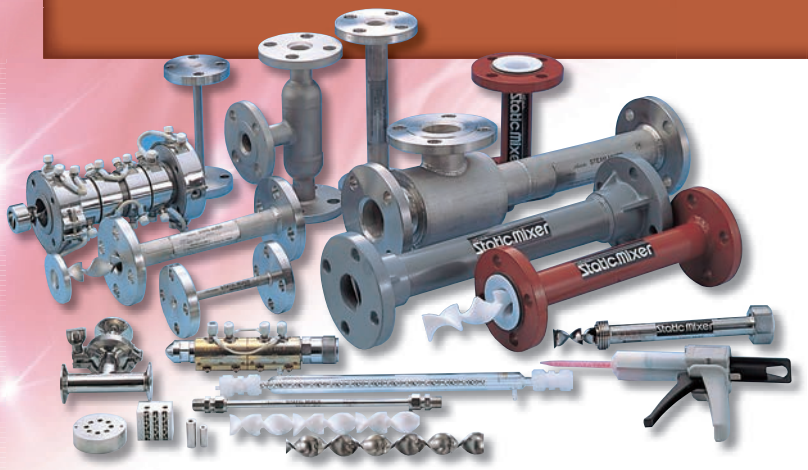
Even with two low viscosity substances, without mutual solubility like water and oil, they are mostly dispersed during the conversion process.You can see how the particles get smaller each time the fluid passes through the element .

## Mixing High Viscosity Material

Out of the three mixing principles, high viscosity material is mostly mixed during the division process and conversion process. You can see that with each element pass the stripes increase and it is mixed.



# Noritake Static Mixer
# Innovation for the Mixing Process

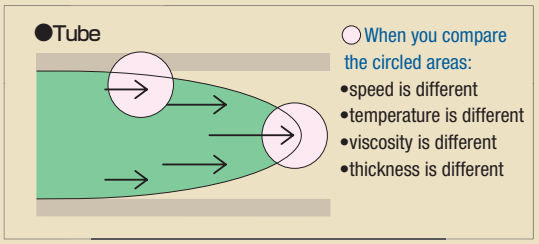


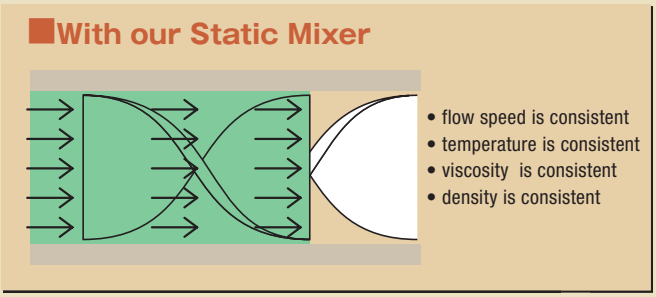

The simple and unique dimensions of our elements are not only necessary for superior mixture but also for production of superior products.
We hope that our mixer will be useful in your development of new processes and products.

## homogenize

### Reliably Homogenizing Liquids

It is easy for a liquid flowing along an inner cylinder streamline to become inhomogeneous. This condition cannot disappear on its own. This is why variances in temperature and viscosity occur, causing variances in the finished products. The mixing effects in Static Mixers homogenize the flowing liquid by the radial direction inside the mixer. Also, the configuration of the static mixer is simple, so there are virtually no places for fluid buildup. It also contributes to the homogenization of melted material when casting a resin cast and improves the accuracy of measured concentration caused by homogenization, before the temperature and density sensors.

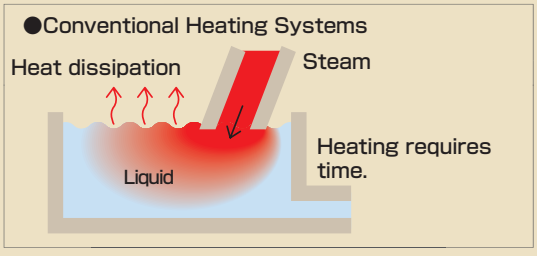


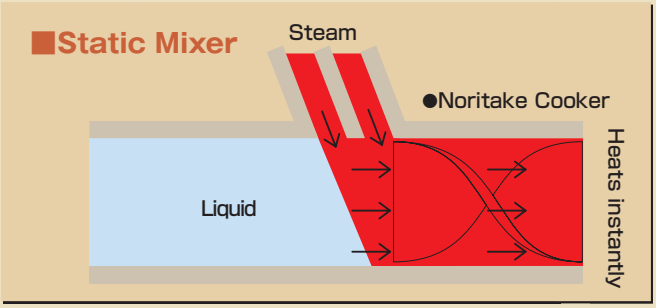




## direct heating

### Heating is brief so there are no, heating irregularities or burning.

By condensing liquid by directly injecting steam into it, the process is able to transfer the steams high amount of heat (about 650kcal/kg) into the liquid. The steam is compressed by the static mixer and condensation is completed in an instant. This is how the time needed for heating is extremely reduced. Also, through the mixing effect of the static mixer, an even heat is transfered. This is useful in the post salt out heating process in ABS production, heating of PVC slurry, the sanitization of pudding and so on.

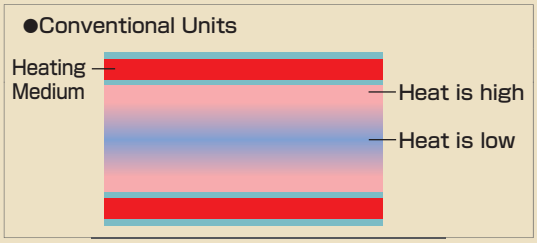


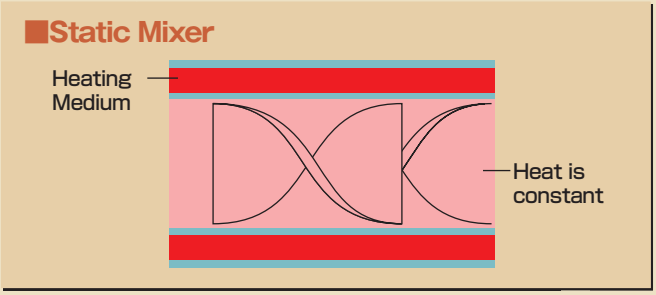



## heat exchange

### Greatly Improved Heat Exchange Efficiency

The membrane resistance of the tube wall region decreases by conversion process of the flow of the static mixer, and heat exchange efficiency is largely (3~5 times) improved. The more highly viscous the fluid is, the more prominent the results are. Moreover, the conversion process of the static mixer switches the liquid between the cylinder wall and center part, keeping the liquid from being exposed to the temperature of the heat medium for a prolonged length of time. This prevents a change or deterioration of product quality.

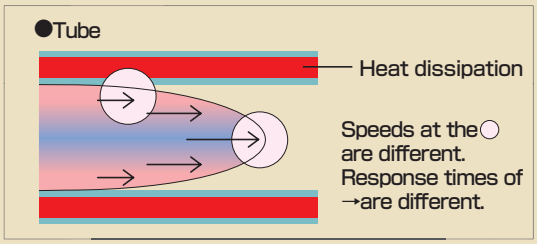


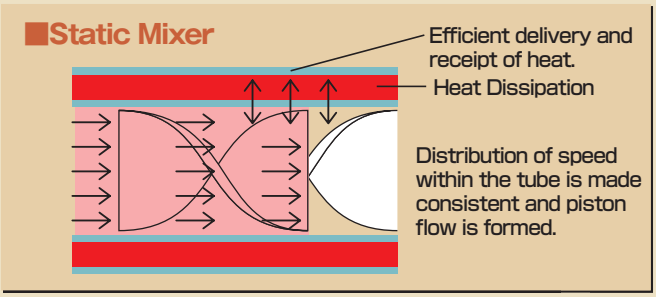




## reaction

### Superior results for Inline Type Continuous Reactor.

This process is realized by the piston flow created by the static mixer and efficient delivery and receipt of heat reaction from the heat exchange process. This can be utilized in reaction processes of the scientific industry such as continuous polymerization reactions of polymer, maleinzation reactions and so on.

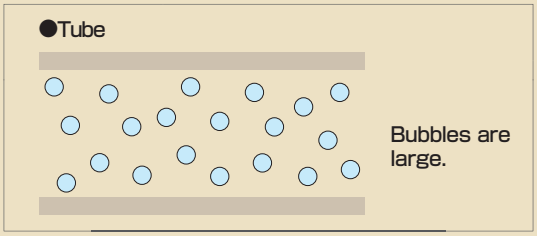


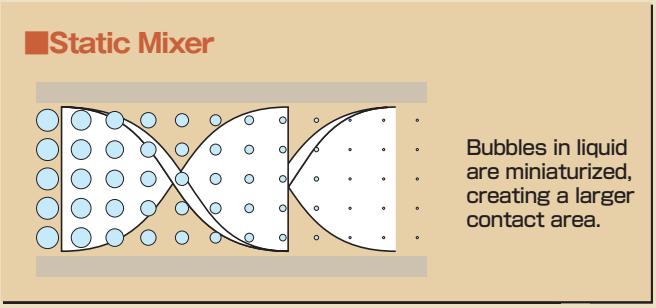




## gas absorption

### Dissolution Efficiency is drastically enhanced.

Important points among the principles of dissolving gas into liquid are “low heat and high pressure” and “ how much you can broaden the contact interface”. Because the bubbles inside the static mixer are made so fine, the contact interface is very large. This drastically increases the dissolution efficiency. This can be used in aeration processes, the carbonic acid gas absorption process in beer manufacturing, the absorption process or ammonia gas into water to create ammonia water and so on.



# Full line-up in response to various needs

## Mixing

P11～18

| Use | Mixing of liquid liquid | Mixing of liquid gas | Mixing of the gas gas | For testing |
|---|---|---|---|---|
| Examples | •Mutual solubility of two liquids ( Good )<br>•Mutual solubility of two liquids ( Bad )<br>•Dilution, Neutralization, Compounding<br>•Dispersion, Extraction, Emulsification,<br>•Addition/ pH adjustment<br>•Alkali cleaning<br>•Super critical liquid extraction | •Drainage pH adjustment<br>•Aeration<br>•Deaeration<br>•Carbonation<br>•Deoxidation of organic liquid | •Adjusting of atmosphere gas<br>•Gaseous fuel adjusting<br>•By-product gas recycling<br>•Denitrification of flue gas<br>•Temperature homogenization of high temperature gas | •Visual observation of the fluid mixture<br>•Test by the small lots |
| Recommended items | N10, N60, C,T,G,N33,N30,N26,CSM, N50,FSM, WSM,MX, Anti corrosive N60 series | | | N40, C,T series |

## Homogenization

P19～20

| Use | Chemical fiber spinning process use | | Extruder use | Injection molder use | |
|---|---|---|---|---|---|
| Examples | ·Improvement of the viscosity and the temperature irregularity in the distribution tube<br>·Dissimilar polymer blend | ·Improvement of the viscosity and the temperature irregularity in the spinning nozzle<br>·Mixing of additive | ·Improvement of the viscosity and the temperature irregularity occurring in the extruder | ·Improvement of the viscosity and the temperature irregularity occurring in the injection molder | |
| Recommended items | N20 series | Sleeve<br>Spinning pack<br>Pump block | TM series (Thermo mixer) | PM series (Polymer mixing nozzle) | |

## Direct heating heat exchange reaction

P22～26

| Use | Direct heating (Inject steam directly into liquid to condense it) | | Direct cooling (Inject cold water directly in steam and vaporize | Indirect heating (Heating of heat transfer liquid) | Indirect cooling (Cooling of refrigerant iquid) |
|---|---|---|---|---|---|
| Examples | ·Warm water production<br>·Heating of chemicals | ·Heating of slurry<br>·Heating /sterilization of the highly viscous liquid | ·Temperature decrease and low pressure steam production | ·Heating of the process liquid<br>· Heating of the chemical raw materials (polymer)<br>· Heating and sterilization of the food raw materials.<br>· Viscosity adjustment flash preheater of the coating liquid for de-monomers | ·Cooling of the process liquid<br>·Cooling of the chemical raw materials (polymer)<br>·Cooling of the food raw materials<br>·Viscosity adjustment of the coating liquid |
| Recommended items | SME-V series (Steam mixer) | NST series (Noritake cooker) | DSM series<br>SM De-superheater | STHE, SMHE series (SM multi-tube heat exchanger) | SMHED, SMHEDN/S series (SM double tube heat exchanger) |

## Gas absorption (Addition function)

P27～28

| | | | | |
|---|---|---|---|---|
| Examples | ·Chlorination reaction<br>·Production of Ammonia water<br>·Production of liquid bleach of pulp | ·Absorption mixing of the low pressure liquid<br>·Absorption collection of the reaction gas<br>·Production of Ozone water | | |
| Recommended items | SMD series (Dispersion mixer) | WEM series (Water jet mixer) | | |

# INDEX

## Single use

・Processes which are impossible to clean
・On the spot operation

DSP series



*Edge seal :Method of fixing without gaps between elements and housings.

## Reaction
(Polymer temperature rising・Homolytic reaction)

・Removal of heat of reaction
・Continuous polymerization reaction system in bulk polymerization

Noritake reactor

# Abundant Experience and the Reliable Know-how

## Examples of Static Mixer applications in the major industries.

### ◆Petrochemistry / Plastic (film)

| Use | Production of emulsion fuel oil | Deoxidation of the organic aqueous solution | Polymer bulk polymerization | Slurry heating | Polymer cooling |
|---|---|---|---|---|---|
| Examples | Adjustment of S-component in heavy oil | Alkali stock solution + nitrogen gas | Continuation polymerization vessel of the PS | Slurry heating after ABS salting-out | Cooling before pushing film out |
| Recommended items | Fixed element type<br>N10 series ····· p11<br>Large diameter type<br>N16 series ····· p12 | Removable element type<br>N60 series ····· p12 | Flash preheater<br>STHE series ····· p25<br>Noritake reactor··· p26 | Cooker for heating raw materials<br>NST series ····· p23 | Heat exchanger for indirect cooling<br>SMHED series··· p25<br>STHE series··· p25 |

### ◆Fiber

| Use | Polymer cooling | Polymer homogenization | Mixing of Additives | Continuous polymerization of polyurethane elastic fiber | Production of spinning water/ water for yarn spinning |
|---|---|---|---|---|---|
| Examples | Polymer cooler for direct spinning process | Viscosity homogenization of the spinning distribution process | Process of special thread manufacturing | Polyol + Isocyanate | Wet spinning water and its humidification |
| Recommended items | Polymer cooler<br>(Heat exchanger for indirect cooling)<br>SMHED series··· p25<br>STHE series ····· p25 | For molten polymer<br>N20series ····· p19 | Sleeve,Spinning pack/ Pump block ····· p19 | Noritake reactor··· p26 | Steam mixer for direct heating<br>SME-V series ···p22 |

### ◆Coating liquid / Adhesive

| Use | Mixing of two component liquid resin | Heating /cooling of coating liquid | Coloring of coating slip | Single use | Temperature homogenization |
|---|---|---|---|---|---|
| Examples | Base resin + hardener | Viscosity control of coating liquid | Adhesive + colorant | Imposible to clean processes and site operations | Coating liquid homogenization |
| Recommended items | Small diameter type<br>T series ····· p13<br>Sanitary finish type<br>N33, N30 series p15 | Heat exchanger for indirect heating / cooling<br>SMHED series ·····p25<br>STHE series ·····p25 | Removable element type<br>N60 series ····· p12<br>Sanitary finish type<br>N33, N30 series··· p15 | Disposable mixer<br>DSP series ····· p14 | Sanitary finish type<br>N33 series ·····p15<br>N30 series ·····p15 |

### ◆Paper pulp

| Use | Dilution of the medicinal solution | Production of calcium hypochlorite | Hot water production | Pulp stock preparation process | Pulp bleaching process |
|---|---|---|---|---|---|
| Examples | Size agent + water | Calcium hydroxide suspension + chlorine gas | Pulp raw materials dissolution | Pulp slurry + medicinal solution | Pulp slurry + chlorine gas |
| Recommended items | Removable element type<br>N60 series ····· p12 | Dispersion mixer<br>SMD series ····· p27 | Steam mixer for hot water production<br>SME-V series ····· p22 | Polished finish type<br>N26 series ····· p15 | Anti corrosive types<br>FSM series ··· p17 |

### ◆Food

| Use | Mixing of dairy products | Instant miso production | Dairy cream cooking | Seasoning/ flavor liquid sterilization | Food patterning |
|---|---|---|---|---|---|
| Examples | Whipped cream + custard cream | Miso + seasoning/flavored liquid | Direct heating of ingredients/raw materials | Direct heating/indirect heating | Unique coloring that uses half mixing |
| Recommended items | Sanitary finish type<br>N33 series ····· p15<br>N30 series ····· p15 | Removable element type<br>N60 series ····· p12 | Ingredients/ raw materials cooker<br>NST series ····· p23 | Sanitary finish heat exchanger for indirect heating/cooling<br>SMHEDN/S series p26<br>STHE/S series ··· p26 | Sanitary finish type<br>N33 series ·····p15<br>N30 series ·····p15 |

### ◆Environment

| Use | pH adjusting of industrial wastewater | Aeration | Chemical addition | Pressurized flotation process | Production of Ozon water |
|---|---|---|---|---|---|
| Examples | Addition of sulfuric acid | Wastewater + air | Coagulant/coagulant aid addition | Pressurized water + air | Ozone gas + water |
| Recommended items | Various anti corrosive types<br>CSM, N50, WSM,<br>Anti corrosive N60 series<br>····· p16~18 | Anti corrosive types<br>CSM, WSM series p16~17<br>General spread type<br>N10,N60 series p11~12 | Anti corrosive types<br>CSM, N50 series p16<br>General spread type<br>N10,N60 series p11~12 | Fixed element type<br>N10 series ····· p11<br>Large diameter type<br>N16 series ····· p12 | Water jet mixer<br>WEN series·····p28 |

### ◆Electronics

| Use | Gas mixing | Prevention of sedimentation | Viscosity control | Production of Ozone water | Heating of pure water |
|---|---|---|---|---|---|
| Examples | Mixing of furnace atmosphere | Electronic paste | Printing ink | Ozone gas + ultra pure water | Indirect heating |
| Recommended items | Small diameter type<br>T series ····· p13<br>Gas mixing<br>G series ····· p14 | Small diameter type<br>T series ····· p13<br>Sanitary finish type<br>N33, N30 series p15<br>All teflon type MX series p17 | Indirect heating heat exchanger<br>SMHED series ··· p25<br>STHE series ····· p25 | Water jet mixer<br>WEN series ····· p28 | Indirect heating heat exchanger<br>SMHEDN/S series p26<br>STHE/S series ··· p26 |

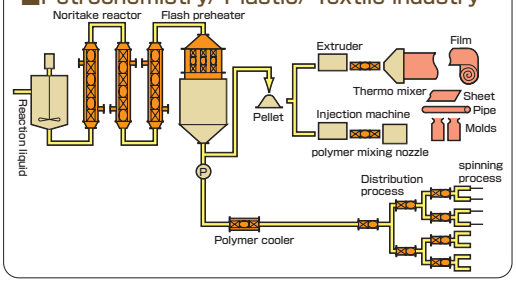
### ◆Medicine, cosmetics

| Use | Dilution of the enrichment raw material | Deoxidation of pack during packing | Deactivation by heating of collection yeast | Heating of seat gel raw material | Cooling of fomentation gel |
|---|---|---|---|---|---|
| Examples | Dilution of a sugar solution for drinkable preparation | Instillation + nitrogen gas | Direct heating | Indirect heating | Indirect cooling |
| Recommended items | Sanitary finish type<br>N33 series ····· p15<br>N30 series ····· p15 | Sanitary finish type<br>N33 series ····· p15<br>N30 series ····· p15 | Cooker for heating raw materials<br>NST series ····· p23 | Indirect heating heat exchanger<br>SMHEDN/S series p26<br>STHE/S series ··· p26 | Indirect cooling heat exchanger<br>SMHEDN/S series p26<br>STHE/S series ··· p26 |

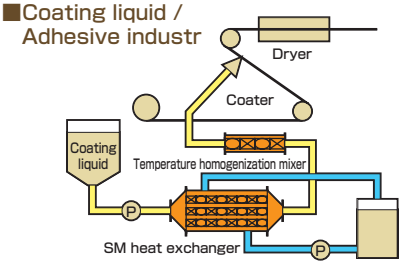
◆Introduction to engineering facilities
(Seperate catalog available)

| | | |
|---|---|---|
| Polymer homogenization | Production of hot water for reaction tank | Coating liquid continuous mixing system<br>Sulfuric acid dilution system<br>Caustic soda dilution system<br>pH adjusting system<br>Continuous polymerization reaction system<br>In-line powder dissolution system<br>PVA continuous dissolution system |
| Extrusion/ injection molding | Uniform heating of hot water for heat medium | |
| Thermo mixer (for films)<br>TM series ····· p20<br>Polymer mixing nozzle(for molds)<br>PM series ····· p20 | Steam mixer for hot water production<br>SME-V series ··· p22 | |
| Production of oil for spinning | Polymer heating | pH adjusting system<br>Continuous polymerization reaction system<br>Sulfuric acid dilution system |
| Oil emulsification | Heating of polymer, raw material for spinning | |
| Removable element type<br>N60 series····· p12 | Indirect heating heat exchanger<br>SMHED series ··· p25<br>STHE series ··· p25 | |
| Uniformed heating of hot water for temperature control | Production of cold water for temperature control | Coating liquid continuous mixing system<br>Color liquid continuation supply system<br>PVA continuous dissolution system<br>Coating liquid precision Temperature (viscosity) adjusting system<br>Adhesive temperature adjusting system<br>Ceramic roll mill<br>Consecutive degassing deaeration system |
| Industrial water + steam | Industrial water + chiller water | |
| Steam mixer<br>SME-V series ····· p22 | Element fixed type<br>N10 series ····· p11 | |
| Gelatinization of starch for paper manufacture | ··· | Sulfuric acid dilution system<br>Caustic soda dilution system<br>Starch gelatinization system<br>PVA continuous dissolution system |
| Starch slurry + steam | ··· | |
| Cooker for heating raw materials<br>NST series ····· p23 | ··· | |
| Hot water Production for cleaning | Aeration | Flower paste manufacturing system<br>Seasoning liquid mixing system for miso<br>Scrambled eggs continuation manufacturing system<br>Seasoning liquid heating sterilization cooling system<br>aseptic sterilization system |
| CIP process | Carbon dioxide gas absorption | |
| Caustic soda warming use Steam mixer<br>SME-V series ····· p22 | Sanitary finish type<br>N33 series ····· p15<br>N30 series ····· p15 | |
| Water supply sterilization | ··· | pH adjusting system<br>Caustic soda dilution system<br>Sulfuric acid dilution system<br>In-line powder dissolution system<br>Nox gas-recovery system |
| Water supply + sodium hypochlorite | ··· | |
| Element fixed type<br>N10 series ····· p11<br>Large diameter type<br>N16 series ····· p12 | ··· | |
| Raw material compounding | Medicinal solution mixing | Ceramic roll mill<br>Consecutive degassing deaeration systems<br>Caustic soda dilution system<br>Sulfuric acid dilution system<br>Box blender<br>In-line powder dissolution system |
| Coating liquid mixing | Dilution of washings | |
| All teflon type<br>MX series ····· p17<br>Sanitary finish type<br>N33, N30 series p15 | All teflon type<br>MX series ····· p17 | |
| Toothpaste cooling | Hot water Production for cleaning | Caustic soda dilution system<br>Ceramic roll mill<br>In-line powder dissolution system<br>In-line starch saccharification system<br>Box blender<br>Aseptic sterilization system<br>Tube type IH heating system<br>Noritake mini cooker |
| Indirect cooling | Pure water + pure steam | |
| Indirect heating heat exchanger<br>SMHEDN/S series p26<br>STHE/S series ·····p26 | Steam mixer<br>SME-V series ··· p22 | |

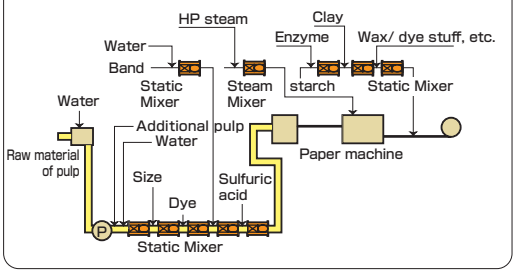
## ■Petrochemistry/ Plastic/ Textile industry



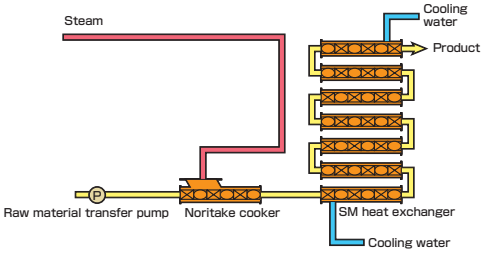

## ■Coating liquid / Adhesive industr



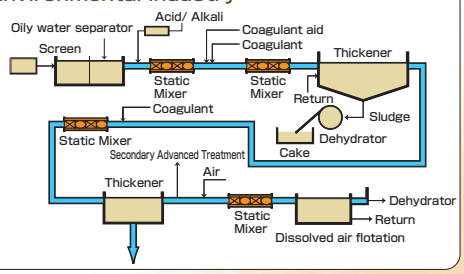

## ■Paper pulp industry



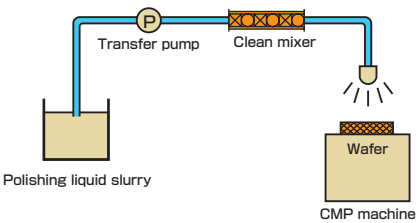

## ■Food industry




## ■Environmental industry

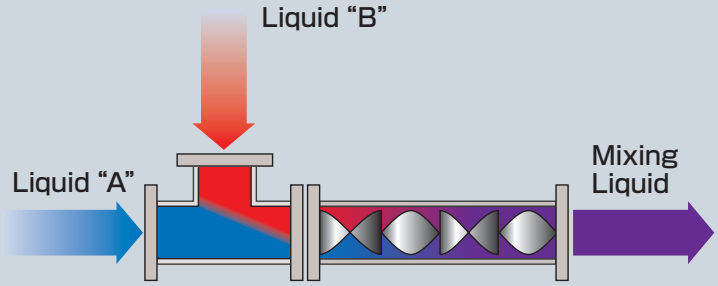



## ■Electronics industry



## Basic Functions

The mixing process includes dilution, neutralization, division, extraction and so on.
The static mixer, through the three mixing principles of division, conversion and inversion, can be conformed to the various mixing processes.
Compared to a conventional Batch System, it is superior in reproducibility, precision and consistent mixing.
Also, the static mixer is inexpensive to maintain, energy efficient and space efficient.
We carry a wide variety of models to meet all types of needs.




# N10 Series.

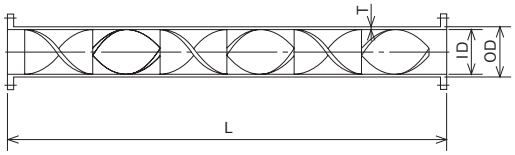
Standard/ Fixed Element Type.

The element is welded securely to the housing on both sides. 6 elements per module is standard and you can choose the number of modules according to use. Just some of the many basic applications include: compounding, dispersion, neutralization, extraction, and so on.

### Standard Specifications

Diameter : ⅜"~10"
Material : 304S.S
Number of Elements : 6 per module
Element Fixing : Welded on both ends
Fixing : JIS10K Flange
Housing Schedule : 40

### Dimensions




### Model Code Chart

1 – N10 – 3 3 1 – 1

- 1 Diameter
- N10 Model
- 3 Housing Schedule: 3 40, 5 80
- 3 Material: 1 Carbon Steel, 2 316S.S, 3 304S.S, 8 316S.S (Element:316LS.S)
- 1 Number of Elements: 1 6, 2 12, 3 18, n n
- 1 Joint: 0 None, 1 JIS 10K-FF, 2 ANSI 150LB, 3 JPI 150LB, 4 Other, N PT Male Pin

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| ⅜-N10-331-1 | ⅜" | 17.3 | 12.7 | 2.3 | 130 | 1.2 |
| ½-N10-331-1 | ½" | 21.7 | 16.1 | 2.8 | 160 | 1.4 |
| ¾-N10-331-1 | ¾" | 27.2 | 21.4 | 2.9 | 210 | 2.0 |
| 1-N10-331-1 | 1" | 34.0 | 27.2 | 3.4 | 275 | 3.2 |
| 1¼-N10-331-1 | 1¼" | 42.7 | 35.5 | 3.6 | 340 | 4.5 |
| 1½-N10-331-1 | 1½" | 48.6 | 41.2 | 3.7 | 400 | 5.2 |
| 2-N10-331-1 | 2" | 60.5 | 52.7 | 3.9 | 520 | 7.7 |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| 2½-N10-331-1 | 2½" | 76.3 | 65.9 | 5.2 | 640 | 13.0 |
| 3-N10-331-1 | 3" | 89.1 | 78.1 | 5.5 | 760 | 16.7 |
| 4-N10-331-1 | 4" | 114.3 | 102.3 | 6.0 | 980 | 27.0 |
| 5-N10-331-1 | 5" | 139.8 | 126.6 | 6.6 | 1200 | 45.0 |
| 6-N10-331-1 | 6" | 165.2 | 151.0 | 7.1 | 1420 | 65.3 |
| 8-N10-331-1 | 8" | 216.3 | 199.9 | 8.2 | 1860 | 126.0 |
| 10-N10-331-1 | 10" | 267.4 | 248.8 | 9.3 | 2320 | 220.0 |

# N60 Series.

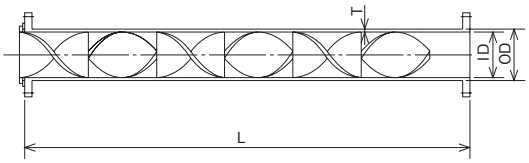
Standard Diffusion/ Detachable Type.

Application of the N60 series is the same as the N10 series, except the element is welded to a ring that allows the element to be removed from the housing. This is useful in applications that require disassembly cleaning.

## ■ Standard Specifications

Diameter : ⅜"~6"
Material : 304S.S
Number of Elements : 6 per module
Element Fixing : Ring Weld (Removable Element)
Fixing : JIS10K Flange
Housing Schedule : 40

## ■ Dimensions




## ■ Model Code Chart

1 – N60 – 3 3 1 – 1

- 1 Diameter
- N60 Model
- 3 Housing Schedule: 3 40; 5 80
- 3 Material: 1 Carbon Steel; 2 316S.S; 3 304S.S; 8 316S.S (Element:316LS.S)
- 1 Number of Elements: 1 6; 2 12; 3 18; (n) n
- 1 Joint: 0 None; 1 JIS 10K-FF; 2 ANSI 150LB; 3 JPI 150LB; 4 Other; N PT Male Pin

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| ⅜-N60-331-1 | ⅜" | 17.3 | 12.7 | 2.3 | 130 | 1.2 |
| ½-N60-331-1 | ½" | 21.7 | 16.1 | 2.8 | 165 | 1.4 |
| ¾-N60-331-1 | ¾" | 27.2 | 21.4 | 2.9 | 210 | 2.0 |
| 1-N60-331-1 | 1" | 34.0 | 27.2 | 3.4 | 275 | 3.2 |
| 1¼-N60-331-1 | 1¼" | 42.7 | 35.5 | 3.6 | 340 | 4.5 |
| 1½-N60-331-1 | 1½" | 48.6 | 41.2 | 3.7 | 400 | 5.2 |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| 2-N60-331-1 | 2" | 60.5 | 52.7 | 3.9 | 520 | 7.7 |
| 2½-N60-331-1 | 2½" | 76.3 | 65.9 | 5.2 | 640 | 13.0 |
| 3-N60-331-1 | 3" | 89.1 | 78.1 | 5.5 | 760 | 16.7 |
| 4-N60-331-1 | 4" | 114.3 | 102.3 | 6.0 | 980 | 27.0 |
| 5-N60-331-1 | 5" | 139.8 | 126.6 | 6.6 | 1200 | 45.0 |
| 6-N60-331-1 | 6" | 165.2 | 151.0 | 7.1 | 1420 | 65.3 |

# N16 Series.

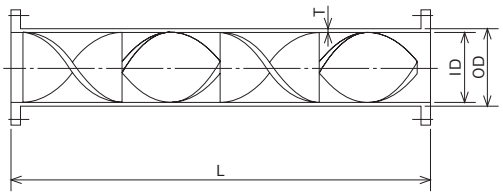
Standard. Large-Diameter Type.

N16 Type is an affordable Large-diameter type.
4 elements per module is standard. Mainly used for gas mixing and water treatment.

## ■ Standard Specifications

Diameter : 6"~20"(20"+ options available)
Material : 304S.S
Number of Elements : 4 per module
Element Fixing : Welded on both ends
Fixing : JIS10K Flange
Housing Schedule : 20S (Material S.S), 40 (material: Carbon Steel).

## ■ Dimensions




## ■ Model Code Chart

10 – N16 L – 2 3 (4) – 1

- 10 Diameter
- N16 Model
- L L/D: L 1.5; Z 1.2
- 2 Housing Schedule: 2 20S; 3 40
- 3 Material: 1 Carbon Steel; 2 316S.S; 3 304S.S; 8 316S.S (Element:316LS.S)
- (4) Number of Elements: (4) 4; 1 6
- 1 Joint: 1 JIS 10K-FF; 2 ANSI 150LB; 3 JPI 150LB; 4 Other

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| 6-N16L-23 (4) -1 | 6" | 165.2 | 155.2 | 5.0 | 1000 | 45 |
| 8-N16L-23 (4) -1 | 8" | 216.3 | 203.3 | 6.5 | 1270 | 84 |
| 10-N16L-23 (4) -1 | 10" | 267.4 | 254.4 | 6.5 | 1600 | 126 |
| 12-N16L-23 (4) -1 | 12" | 318.5 | 305.5 | 6.5 | 1900 | 172 |

※ N10,N60 and N16 series can be configured to correspond with high-pressure gas safety regulations.

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| 14-N16Z-23 (4) -1 | 14" | 355.6 | 339.6 | 8.0 | 1800 | 200 |
| 16-N16Z-23 (4) -1 | 16" | 406.4 | 390.4 | 8.0 | 2100 | 265 |
| 18-N16Z-23 (4) -1 | 18" | 457.2 | 441.2 | 8.0 | 2300 | 330 |
| 20-N16Z-23 (4) -1 | 20" | 508.0 | 492.0 | 8.0 | 2600 | 407 |

# N40 Series.
## Type for Testing

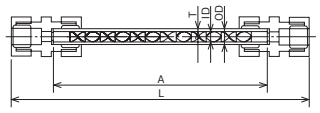
A glass cylinder is used in the housing so that the flow can be monitored. Mainly used for testing.

### Standard Specifications

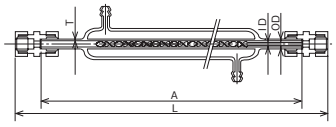
Diameter : 5.0, 8.0, 11.0(mm)
Material : Housing: Glass. Element: 316S.S
Number of Elements : 12(Standard Type), 24 (Dual Cylinder Type)
Element Fixing : Teflon connector stopper.
Fixing : Teflon connector
Working Pressure : 0.1MPaG

### Dimensions

● Standard Type




● Dual Tube Type




### Model Code Chart

1/2 (1) – N40 – 1 7 – 4 – 0

- 1/2: Inner Diameter (ID) (mm) — 1/4: 5.0, 3/8: 8.0, 1/2: 11.0
- (1): Jacket side diameter — 1: Special Size
- N40: Model
- 1: Glass Thicknessr — 1: Special
- 7: Material — 7: Element:316S.S Housing:Glass
- 4: Number of Elements — 2: 12, 4: 24
- 0: Fitting — 0: Teflon Connector

● Standard Type

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm |
|---|---|---|---|---|---|
| 1/4-N40-172-0 | 8.0 | 5.0 | 1.5 | 100 | (145) |
| 3/8-N40-172-0 | 12.0 | 8.0 | 2.0 | 150 | (215) |
| 1/2-N40-172-0 | 15.0 | 11.0 | 2.0 | 200 | (272) |

● Dual Tube Type

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm |
|---|---|---|---|---|---|
| 1/4 (1) -N40-174-0 | 8.0 | 5.0 | 1.5 | 280 | (325) |
| 3/8 (1) -N40-174-0 | 12.0 | 8.0 | 2.0 | 380 | (445) |
| 1/2 (1) -N40-174-0 | 15.0 | 11.0 | 2.0 | 480 | (552) |

# C Series.
## Small Diameter Type

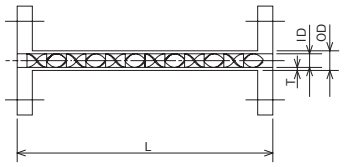
C series comes with a thick walled tube and joints connect to a flange. You can choose from 12 or 24 elements per module, depending on your application. These are mostly used for tests in the chemical industry. You can choose from Edge Seal Fixed Type Elements and Removable Type Elements for disassembly cleaning.

### Standard Specifications

Diameter : 4.0, 5.0, 8.0, 11.0(mm)
Material : 304S.S
Number of Elements : 12, 24
Element Fixing : Fixed Type: Edge Seal.
: Removable Type: Stopper Ring
Fixing : JIS10K Flange

PAT.1327449

### Dimensions




### Model Code Chart

C 3 6 – 12 ( ) – 1 (1/2)

- C: Model
- 3: Material — 2: 316S.S, 3: 304S.S, 8: 316S.S (Element:316LS.S)
- 6: Diameter (mm) — 3: 4.0, 4: 5.0, 6: 8.0, 8: 11.0
- 12: Number of Elements — 12, 24
- ( ): Element Fixing — Edge Seal, R: Removable
- 1: Joint — 0: None, 1: JIS 10K-FF, 2: ANSI 150LB, 4: Other
- (1/2): Flange Diameter — 3/8", 1/2", 3/4"

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm 12Element | Length Lmm 24Element |
|---|---|---|---|---|---|
| C33-□-1 (1/2) | 10.0 | 4.0 | 3.0 | 80 | 160 |
| C34-□-1 (1/2) | 10.0 | 5.0 | 2.5 | 100 | 195 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Thickness Tmm | Length Lmm 12Element | Length Lmm 24Element |
|---|---|---|---|---|---|
| C36-□-1 (1/2) | 14.0 | 8.0 | 3.0 | 155 | 300 |
| C38-□-1 (1/2) | 16.0 | 11.0 | 2.5 | 210 | 410 |

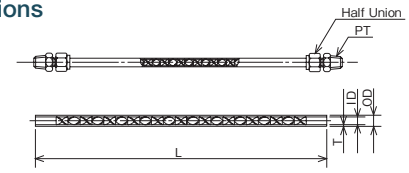
# T Series.
## Small Diameter Type

T series comes standard with a thinner pipe wall and a bite type fitting. Usually used for gas mixing. Elements are available in Edge Seal Fixed Type.

### Standard Specifications

Diameter : 3.4, 5.0, 8.0, 11.0(mm)(diameter of mixing part)
Material : Element: 316LS.S Housing: 316S.S
Number of Elements : 12, 24
Element Fixing : Edge Seal.
Fixing : Half Union, PT Male Pin

### Dimensions




### Model Code Chart

T 3 – 12 – 2PT

- T: Model
- 3: Inner Diameter (ID) (mm) — 3: 3.4, 4: 5.0, 6: 8.0, 8: 11.0
- 12: Number of Elements — 12, 24
- 2PT: Joint (Half Union) — None, 1PT: 1/8PT, 2PT: 1/4PT, 3PT: 3/8PT, 4PT: 1/2PT, S: Other Union

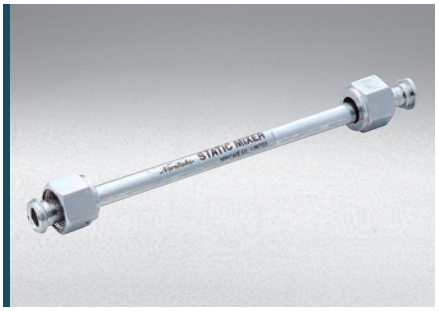
| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm |
|---|---|---|---|---|
| T3-12□-□ | 4.76 | 3.4 | 0.68 | 75 |
| T3-24□-□ | 4.76 | 3.4 | 0.68 | 135 |
| T4-12□-□ | 6.0 | 5.0 | 0.5 | 100 |
| T4-24□-□ | 6.0 | 5.0 | 0.5 | 190 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm |
|---|---|---|---|---|
| T6-12□-□ | 10.0 | 8.0 | 1.0 | 155 |
| T6-24□-□ | 10.0 | 8.0 | 1.0 | 300 |
| T8-12□-□ | 12.7 | 11.0 | 0.85 | 210 |
| T8-24□-□ | 12.7 | 11.0 | 0.85 | 410 |

※ Special order Straight Union type also available.

# G Series.

## Small Diameter Clean Type

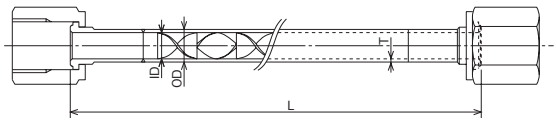



Electropolished 316LS.S for cleanliness. Usually used in the mixing process of clean gas for semiconductor manufacturing.

### Standard Specifications

Diameter : ¼"~½"
Material : 316LS.S
Number of Elements : 6 per module
Element Fixing : Crimp Lock
Fixing : VCR Joint
Finish : Electropolished

### Dimensions




### Model Code Chart

G — Model
1/4 — Diameter (mm): ¼" / ⅜" / ½"
6 — Number of Elements: 6 / 18

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm |
|---|---|---|---|---|
| G¼- 6 | 6.35 | 4.35 | 1.0 | 140 |
| G¼-18 | 6.35 | 4.35 | 1.0 | 215 |
| G⅜- 6 | 9.53 | 7.53 | 1.0 | 170 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm |
|---|---|---|---|---|
| G⅜-18 | 9.53 | 7.53 | 1.0 | 300 |
| G½- 6 | 12.70 | 10.22 | 1.24 | 190 |
| G½-18 | 12.70 | 10.22 | 1.24 | 370 |

# DSP Series.

## Single Use Type

☐ **Disposable Mixer**
This is a single use type Static Mixer for mixing 2 liquid resins and adhesives. These are particularly convenient when cleaning solvents don't work. These can also be used with automatic bonding machine.

☐ **Dispensing System**
This is a handy mixing set that includes a disposable mixer, resin cartridges and discharge gun. Fill the dual cartridge with each material, attach to an extruder gun and discharge the material. By changing the cartridge, you can choose from the following discharge ratios: 1:1, 1:2, 1:4, 1:10

### Standard Specifications

Material : Polypropylene, polyacetal
● Please see special catalog.

### Model Code Chart

●Disposable Mixer

DSP — Mixer Type — Diameter (mm) — Number of Elements

| Inner Diameter (mm) | Twist MXA | Cap Nut MXC | Screw in MXB | Element Only MXD | Special Type MXE |
|---|---|---|---|---|---|
| 3.0 | MXA3-7 MXA3-13 MXA3-17 | | | | |
| 4.0 | MXA4-13 MXA4-17 | | | | |
| 5.0 5.4 | MXA5.4-7 MXA5.4-13 MXA5.4-17 MXA5.4-21 | MXC5-18 MXC5-24 MXC5-32 | | | |
| 6.3 | MXA6.3-12 MXA6.3-17 MXA6.3-21 | MXC6.3-18 MXC6.3-24 MXC6.3-32 | | MXD6.3-8 (φ6.2 8Elements) | MXE6.3-8 MXE6.3-16 |
| 8.0 | | MXC8-18 MXC8-24 MXC8-32 | | | |
| 9.4 | | | MXB9.4-8 MXB9.4-16 | MXD9.4-8 (φ9.2 8Elements) | |
| 10.0 | | MXC10-18 MXC10-24 MXC10-32 | | | |
| 13.0 | | MXC13-12 MXC13-18 MXC13-24 MXC13-32 | | | |

●Dispensing System

[Gun] DSP — MG — 50 — 0
- MG: Model
- MG: Gun Type — MG: Hand Powered Gun; PG: Air Compressor Gun
- 50: Amount of 2 liquid (cc) — 50: 50Series; 200: 200Series; 400: 400Series
- 0: 2 liquid amount ratio — For 50Series: 0: 1:1, 2:1, 4:1, 10:1 Supports all.; For 200, 400Series: ½: 1:1,2:1

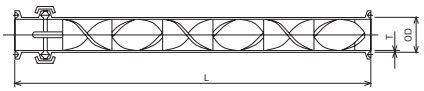
[Cartridge] DSP — CYL — 50 — 1
- CYL: Cartridge
- 50: Amount of 2 liquid (cc) — 50: 50Series; 200: 200Series; 400: 400Series
- 1: 2 liquid amount ratio — 1: 1:1; 2: 2:1; 4: 4:1; 10: 10:1 (only 50series.)

[Plunger] (50series parts.) DSP — PL — 50 — 1
- PL: Plunger
- 50: Amount of 2 liquid (cc)
- 1: 2 liquid amount ratio — ½: 1:1, 2:1; 4: 4:1; 10: 10:1

# N33 Series.
## Sanitary Finish Type

This is our New Sanitary Type Static Mixer with improved clean-ability. Ease of assembly and disassembly has been improved and it is interchangeable with elements of the same size, making it easy to handle. Also, the direction of the flowing liquid is not set, allowing more freedom with installation. High-quality polished finish, inside and out.

### Dimensions




| Model | Nominal Diameter (ND) | Number of Elements | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| 1-N33-131-F | 1S | 6 | 25.4 | 23.0 | 1.2 | 260 | 0.6 |
| 1½-N33-131-F | 1½S | 6 | 38.1 | 35.7 | 1.2 | 380 | 0.9 |
| 2-N33-131-F | 2S | 6 | 50.8 | 47.8 | 1.5 | 495 | 2.0 |
| 2½-N33-131-F | 2½S | 6 | 63.5 | 59.5 | 2.0 | 610 | 3.7 |
| 3-N33-131-F | 3S | 6 | 76.3 | 72.3 | 2.0 | 730 | 4.7 |
| 4-N33-131-F | 4S | 6 | 101.6 | 97.6 | 2.0 | 975 | 8.4 |

### Standard Specifications

Diameter : 1S~4S (standard type)
Material : 304S.S
Number of Elements : 6 (standard type).
Element Fixing : Weld to small cylinder
Fixing : Ferrule, IDF Nut & Bolt
Finish : Sanitary Finish (Option: Electropolished)

### Model Code Chart

**1 – N33 – 1 3 1 – F**

- 1: Diameter
- N33: Model
- Housing Schedule: 1 5S (Sanitary Tube); 2 10S
- Material: 2L 316LS.S; 3 304S.S
- Number of Elements: 1 6; 2 12※; 3 18※※
- Joint: IDF IDF Screw & Nut (over 1S); F Ferrule; 4 Other

※ 2, 6 element types are 2 connected. ※※ 3, 6 element types are 3 connected.

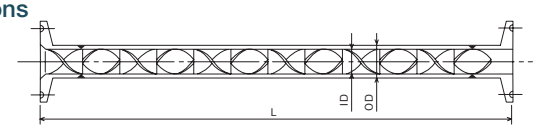
# N30 Series.
## Sanitary Small Diameter Type

This is our small diameter sanitary type model. This carries the same specifications as those sanitary pipes used in the food industry. Installation and removal of elements are easy, making them ideal for processes that require disassembly cleaning.

### Standard Specifications

Diameter : ¼"~½"
Material : 304S.S
Number of Elements : 12
Element Fixing : T bar
Fixing : Ferrule
Finish : Sanitary Finish (Option: Electropolished)

### Dimensions



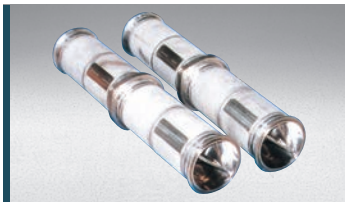

| Model | Nominal Diameter (ND) | Number of Elements | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| ¼-N30-232-F | ¼" | 12 | 13.8 | 10.5 | 1.65 | 200 | 0.16 |
| ⅜-N30-232-F | ⅜" | 12 | 17.3 | 14.0 | 1.65 | 260 | 0.24 |
| ½-N30-232-F | ½" | 12 | 21.7 | 17.5 | 2.1 | 320 | 0.4 |

### Model Code Chart

**1/4 – N30 – 2 3 2 – F**

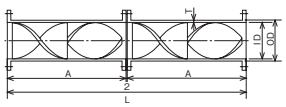
- 1/4: Diameter
- N30: Model
- Housing Schedule: 2 10S
- Material: 2L 316LS.S; 3 304S.S
- Number of Elements: 2 12
- Joint: IDF IDF Screw & Nut (over 1S); F Ferrule; 4 Other; F/R With reducer

# N26 Series.
## Polished Finish Type



The element is fixed to the housing by an edge seal and parts exposed to liquids have a buffed finish. There is no clearance between the element and the housing. This series comes with 2 elements per module and supports disassembled inspection and cleaning.
Therefore, this product is ideal for sticky materials, liquids that are easy to get between the element and housing and fiber slurry liquid processes.

### Dimensions




### Standard Specifications

Diameter : 2"~18"
Material : 304S.S
Number of Elements : 4 (2 per module)
Element Fixing : Edge Seal (No Clearance)
Fixing : Flange (JIS10K-FF), Ferrule
Finish : Polished inner walls.

### Model Code Chart

**N26 – 250 – 3 2 / □**

- N26: Diameter
- Diameter: 50 2"; 65 2½"; ⋮; 450 18"
- Material: 3 304S.S; 3S 316S.S; 3SL 316LS.S; 8 316S.S (Element:316LS.S)
- Number of Elements: 1 2; 2 4; 3 6
- Fitting: None Flange JIS10K-FF; F Ferrule

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| N26- 50-32 | 2" | 60.5 | 52.7 | 3.9 | 160 | 322 | 10 |
| N26- 65-32 | 2½" | 76.3 | 65.9 | 5.2 | 220 | 442 | 16 |
| N26- 80-32 | 3" | 89.1 | 78.1 | 5.5 | 250 | 502 | 19 |
| N26-100-32 | 4" | 114.3 | 102.3 | 6.0 | 310 | 622 | 26 |
| N26-125-32 | 5" | 139.8 | 126.6 | 6.6 | 380 | 762 | 42 |
| N26-150-32 | 6" | 165.2 | 151.0 | 7.1 | 460 | 922 | 59 |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| N26-200-32 | 8" | 216.3 | 203.3 | 6.5 | 620 | 1242 | 91 |
| N26-250-32 | 10" | 267.4 | 254.4 | 6.5 | 770 | 1542 | 145 |
| N26-300-32 | 12" | 318.5 | 305.5 | 6.5 | 800 | 1602 | 192 |
| N26-350-32 | 14" | 355.6 | 340.0 | 7.8 | 880 | 1762 | 257 |
| N26-400-32 | 16" | 406.4 | 390.0 | 8.2 | 1000 | 2002 | 341 |
| N26-450-32 | 18" | 457.2 | 441.0 | 8.1 | 1130 | 2262 | 435 |

# CSM Series.

Anti-corrosive/ Ceramic Type


This element uses a special glazed ceramic. The smooth surface resists scaling and wear. We have prepared all types of housings so you can choose according to the type of liquid, from water processing to chemical processing.

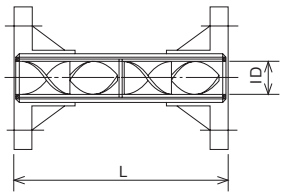
## ■ Standard Specifications

Diameter : 12~150mm ( diameter of mixing area)
Material : Housing : Lining
Element: ceramic
Number of Elements : 4 or 8
Fixing : JIS10K Flange
Working Pressure : Max.0.5MPaG

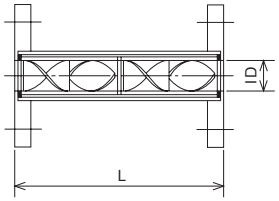
PAT.1327449

## ■ Dimensions

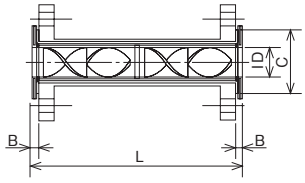
●PVC




●304S.S・316S.S




●Fluorine resin lining




## ■ Model Code Chart

CSM – 100 – 1

- CSM: Model
- 100: Inner Diameter (ID) (mm)
  - 12 12
  - 22 22
  - ⋮
  - 150 150
- 1: Housing Material
  - 1 PVC
  - 3 304S.S
  - 4 316S.S
  - 5 fluorine resin

●PVC

| Model | Nominal Diameter (ND) | Number of Elements | Inner Diameter (ID) IDmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|
| CSM- 12-1 | ¾" | 8 | 12 | 162 | 0.5 |
| CSM- 22-1 | 1¼" | 4 | 22 | 156 | 1.0 |
| CSM- 30-1 | 1½" | 4 | 30 | 206 | 1.5 |
| CSM- 38-1 | 2" | 4 | 38 | 254 | 2.0 |
| CSM- 60-1 | 3" | 4 | 60 | 400 | 4.0 |
| CSM- 80-1 | 4" | 4 | 80 | 520 | 7.5 |
| CSM-100-1 | 5" | 4 | 100 | 660 | 13.0 |
| CSM-150-1 | 8" | 4 | 150 | 980 | 33.0 |

●304S.S・316S.S

| Model | Nominal Diameter (ND) | Number of Elements | Inner Diameter (ID) IDmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|
| CSM- 12-3 | ¾" | 8 | 12 | 155 | 2.0 |
| CSM- 22-3 | 1¼" | 8 | 22 | 277 | 4.5 |
| CSM- 30-3 | 1½" | 4 | 30 | 191 | 4.5 |
| CSM- 38-3 | 2" | 4 | 38 | 239 | 6.0 |
| CSM- 60-3 | 3" | 4 | 60 | 389 | 11.0 |
| CSM- 80-3 | 4" | 4 | 80 | 509 | 15.0 |
| CSM-100-3 | 5" | 4 | 100 | 640 | 26.0 |
| CSM-150-3 | 8" | 4 | 150 | 960 | 64.0 |

●Fluorine resin lining

| Model | Nominal Diameter (ND) | Number of Elements | Inner Diameter (ID) IDmm | B Lmm | C Lmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| CSM- 12-5 | ¾" | 8 | 12 | 5 | 63 | 170 | 2.0 |
| CSM- 30-5 | 1½" | 4 | 30 | 5 | 89 | 205 | 4.5 |
| CSM- 38-5 | 2" | 4 | 38 | 5 | 104 | 250 | 6.0 |
| CSM- 60-5 | 3" | 4 | 60 | 8 | 134 | 406 | 12.0 |
| CSM- 80-5 | 4" | 4 | 80 | 8 | 159 | 526 | 21.0 |
| CSM-100-5 | 5" | 4 | 100 | 10 | 190 | 660 | 30.0 |
| CSM-150-5 | 8" | 4 | 150 | 15 | 270 | 970 | 80.0 |

# N50 Series.

Anti-corrosive/ PVC Type

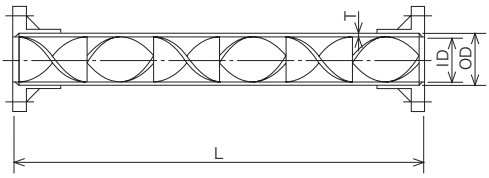

The element, housing and flange of this Static Mixer are all PVC, for placing between two PVC pipes. The N50 is mainly used for pure water processing. Impact-resistant and heat-resistant PVC are also available, even fiberglass reinforcement is possible.

## ■ Standard Specifications

Diameter : ½"~6"
Material : PVC
Number of Elements : 6 per module
Element Fixing : Edge Seal
Fixing : (JIS10K equivalent) Flange
Working Temperature : Max.50℃
Working Pressure : Max.0.5MPaG

PAT.1327449

## ■ Dimensions




## ■ Model Code Chart

1 – N50 – 1 7 1 – 1

- 1: Diameter
- N50: Model
- 1: Housing Schedule
  - 1 Special
- 7: Material
  - 7 PVC
- 1: Number of Elements
  - 4 4
  - 6 6
- 1: Joint
  - 1 (JIS10K equivalent) Flange

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| ½-N50-171-1 | ½" | 22 | 16.0 | 3.0 | 190 | 0.4 |
| ¾-N50-171-1 | ¾" | 26 | 20.0 | 3.0 | 230 | 0.6 |
| 1-N50-171-1 | 1" | 32 | 25.0 | 3.5 | 250 | 0.8 |
| 1¼-N50-171-1 | 1¼" | 38 | 31.0 | 3.5 | 320 | 1.0 |
| 1½-N50-171-1 | 1½" | 48 | 40.0 | 4.0 | 400 | 1.4 |
| 2-N50-171-1 | 2" | 60 | 51.0 | 4.5 | 485 | 1.8 |

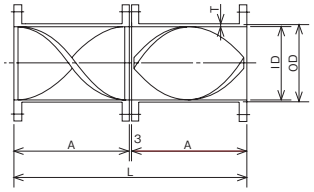
| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| 2½-N50-171-1 | 2½" | 76 | 67.0 | 4.5 | 630 | 2.7 |
| 3-N50-171-1 | 3" | 89 | 77.2 | 5.9 | 740 | 4.2 |
| 4-N50-171-1 | 4" | 114 | 99.8 | 7.1 | 950 | 7.3 |
| 5-N50-171-1 | 5" | 140 | 125.0 | 7.5 | 1180 | 11.1 |
| 6-N50-171-1 | 6" | 165 | 145.8 | 9.6 | 1370 | 16.3 |

# FSM Series.

Anti-corrosive/ Fiberglass Type

The FSM series is a one piece element / housing unit, made FRP Fiberglass. There is no space for fibrous material, etc, to build up in. It is tolerant and resistant against wear and chemical. It includes one element per module and allows detailed inspections and cleaning. These are mostly used in the bleaching process of the paper pulp industry.

## Dimensions




## Standard Specifications

Diameter : 6"~18"
Material : Fiber Reinforced Polyurethane
Number of Elements : 2 (1 per module)
Element Fixing : Edge Seal (no clearance)
Fixing : (JIS10K equivalent) Flange
Working Temperature : Max.70℃
Working Pressure : Max.0.5MPaG

## Model Code Chart

FSM – 150 – 6

- FSM: Model
- 150: Diameter (150 6", 200 8", ⋮, 450 18")
- 6: Material (6 FRP)

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| FSM-150-6 | 6" | 160 | 140 | 10 | 240 | 483 | 20 |
| FSM-200-6 | 8" | 210 | 190 | 10 | 330 | 663 | 26 |
| FSM-250-6 | 10" | 275 | 255 | 10 | 400 | 803 | 35 |
| FSM-300-6 | 12" | 316 | 290 | 13 | 480 | 963 | 56 |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|
| FSM-350-6 | 14" | 356 | 330 | 13 | 550 | 1103 | 80 |
| FSM-400-6 | 16" | 412 | 380 | 16 | 630 | 1263 | 118 |
| FSM-450-6 | 18" | 466 | 430 | 18 | 700 | 1403 | 153 |

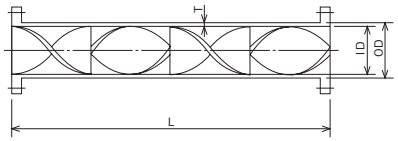
# WSM Series.

Anti-corrosive/ Fiberglass Type

This is an FRP unit with 4 elements per module. These are mostly used in water processing where large diameter openings and anti corrosion are necessary.

PAT.1327449

## Dimensions




## Standard Specifications

Diameter : 6"~18"(18"+ options available.)
Material : FRP
Number of Elements : 4 (1 per module)
Element Fixing : Edge Seal (no clearance)
Fixing : (JIS10K equivalent) Flange
Working Temperature : Max.70℃
Working Pressure : Max.0.3MPaG

## Model Code Chart

WSM – 150 – 6

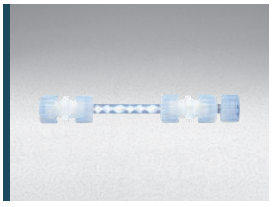
- WSM: Model
- 150: Diameter (150 6", 200 8", ⋮, 450 18")
- 6: Material (6 FRP)

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| WSM-150-6 | 6" | (160) | 140 | (10) | 970 | 15 |
| WSM-200-6 | 8" | (210) | 190 | (10) | 1320 | 24 |
| WSM-250-6 | 10" | (275) | 255 | (10) | 1600 | 37 |
| WSM-300-6 | 12" | (316) | 290 | (13) | 1920 | 62 |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|
| WSM-350-6 | 14" | (356) | 330 | (13) | 2200 | 82 |
| WSM-400-6 | 16" | (412) | 380 | (16) | 2520 | 130 |
| WSM-450-6 | 18" | (466) | 430 | (18) | 2800 | 180 |

# MX Series.

All Teflon Type

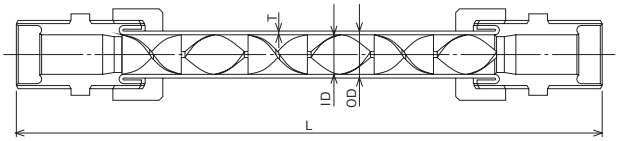


All parts that get exposed to fluids are PFA or PTFE, for anti corrosion and tolerance , and chemical resistant. Fulfilling the clear requirements needed in semiconductor processes, this series is mostly used with chemical dilution.

## Standard Specifications

Diameter : ½"~1"
Material : PFA, PTFE
Number of Elements : 6 (per module)
Element Fixing : Teflon “snap-lock” Connector
Fixing : Teflon Connector (Kurabo Final Lock)
Working Temperature : Max.100℃
Working Pressure : Max.0.5MPaG

## Dimensions




## Model Code Chart

MX 6 5 6 – Ti

- MX: Model
- 6: Housing Diameter (6 ½", 7 ¾", 8 1")
- 5: Joint size (5 ⅜", 6 ½", 7 ¾", 8 1")
- 6: Number of Elements
- Ti: Joint (Kurabo Industries Final Lock; Ti PFA Protruding Tube)

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Joint size |
|---|---|---|---|---|---|---|
| MX656 | ½" | 12.7 | 9.52 | 1.59 | 180 | ⅜" |
| MX666 | ½" | 12.7 | 9.52 | 1.59 | 180 | ½" |
| MX756 | ¾" | 19.05 | 15.87 | 1.59 | 236 | ⅜" |

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Joint size |
|---|---|---|---|---|---|---|
| MX766 | ¾" | 19.05 | 15.87 | 1.59 | 236 | ½" |
| MX876 | 1" | 25.4 | 22.22 | 1.59 | 304 | ¾" |
| MX886 | 1" | 25.4 | 22.22 | 1.59 | 314 | 1" |

# Anti Corrosive N60 Series.

Anti corrosive type.

The elements and housings are made from anti corrosive material or lined with such. You can choose which type depending on the corrosiveness of the liquids you use. These are mostly used in fluid production of chemical industries or water processing (wastewater).

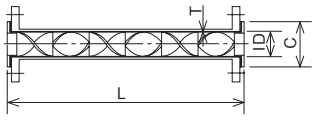
## Model Code Chart

1 – N60 – 3 7(F) 1 – 1

- 1: Diameter
- N60: Model
- 3: Housing Schedule — 3: Special
- 7(F): Material — F: Fluorine resin, R: Rubber, P: PVC/FRP, T: Titanium, H: Hastelloy, C: Carpenter, N: Nickel, M: Monel metal, S: Other
- 1: Number of Elements — (4): 4, 1: 6, 2: 12, 3: 18
- 1: Flange — 1: JIS 10K-FF, 2: ANSI 150LB, 4: Other

## Dimensions

### ● Fluorine resin





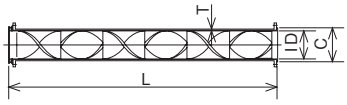
#### Standard Specifications

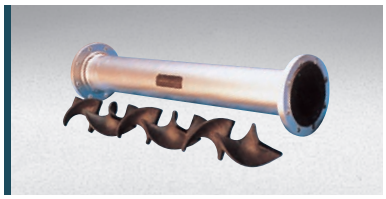
Diameter : ½"~6"
Material : Housing:STPG/ PTFE Lining
Element: PTFE
Number of Elements : 4, 6
Element Fixing : Rings on each end
Fixing : JIS10K Flange

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| ½-N60-37(F) □-1 | ½" | 13.1 | 1.5 | 32 | 170 | 1.6 | 130 | 1.5 |
| ¾-N60-37(F) □-1 | ¾" | 18.4 | 1.5 | 42 | 180 | 1.9 | 130 | 1.7 |
| 1-N60-37(F) □-1 | 1" | 24.2 | 1.5 | 51 | 240 | 3 | 170 | 3 |
| 1½-N60-37(F) □-1 | 1½" | 37.2 | 2.0 | 73 | 370 | 5 | 250 | 5 |
| 2-N60-37(F) □-1 | 2" | 48.7 | 2.0 | 88 | 490 | 7 | 320 | 7 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| 2½-N60-37(F) □-1 | 2½" | 61.9 | 2.0 | 113 | 620 | 12 | 400 | 11 |
| 3-N60-37(F) □-1 | 3" | 72.1 | 3.0 | 125 | 720 | 16 | 470 | 14 |
| 4-N60-37(F) □-1 | 4" | 96.3 | 3.0 | 150 | 920 | 24 | 610 | 21 |
| 5-N60-37(F) □-1 | 5" | 120.6 | 3.0 | 185 | 1140 | 38 | 760 | 34 |
| 6-N60-37(F) □-1 | 6" | 145.0 | 3.0 | 205 | 1350 | 56 | 900 | 50 |

### ● Rubber Lining



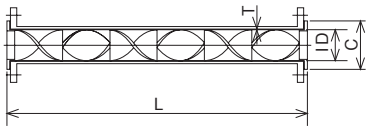
#### Standard Specifications

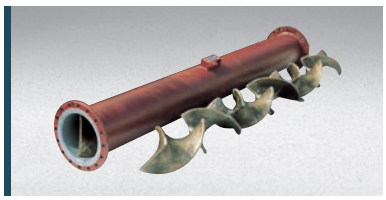
Diameter : 3"~14"
Material : Housing:STPG/ Rubber Lining
Element: SS/ Rubber Lining
Number of Elements : 4, 6
Element Fixing : Ring Weld (Removable Element)
Fixing : JIS10K Flange

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| 3-N60-37(R) □-1 | 3" | 72.1 | 3.0 | 130 | 800 | 17 | 580 | 16 |
| 4-N60-37(R) □-1 | 4" | 96.3 | 3.0 | 155 | 1000 | 29 | 700 | 26 |
| 5-N60-37(R) □-1 | 5" | 120.6 | 3.0 | 185 | 1230 | 47 | 820 | 43 |
| 6-N60-37(R) □-1 | 6" | 145.0 | 3.0 | 215 | 1450 | 68 | 1000 | 62 |
| 8-N60-37(R) □-1 | 8" | 193.9 | 3.0 | 265 | 1900 | 130 | 1300 | 117 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| 10-N60-37(R) □-1 | 10" | 242.8 | 3.0 | 325 | 2350 | 228 | 1600 | 206 |
| 12-N60-37(R) □-1 | 12" | 291.9 | 3.0 | 370 | 2800 | 340 | 1900 | 306 |
| 14-N60-37(R) □-1 | 14" | 327.4 | 3.0 | 415 | 3100 | 450 | 2100 | 405 |

### ● PVC Lining/FRP



#### Standard Specifications

Diameter : 5"~14"
Material : Housing:SGP/ PVC Lining
Element: FRP
Number of Elements : 4, 6
Element Fixing : Ring on each end
Fixing : JIS10K Flange

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| 5-N60-37(P) □-1 | 5" | 126.8 | 2.0 | 175 | 1230 | 38 | 900 | 34 |
| 6-N60-37(P) □-1 | 6" | 150.2 | 2.5 | 205 | 1450 | 56 | 1000 | 50 |
| 8-N60-37(P) □-1 | 8" | 199.7 | 2.5 | 250 | 1900 | 78 | 1300 | 57 |
| 10-N60-37(P) □-1 | 10" | 248.2 | 3.0 | 315 | 2350 | 130 | 1600 | 98 |

| Model | Outside Diameter (OD) ODmm | Inner Diameter (ID) ODmm | Lining thickness Tmm | Cmm | 1 : 6 Element | | 4 : 4 Element | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Length Lmm | Mass kg | Length Lmm | Mass kg |
| 12-N60-37(P) □-1 | 12" | 298.7 | 3.0 | 360 | 2800 | 180 | 1950 | 135 |
| 14-N60-37(P) □-1 | 14" | 332.8 | 3.5 | 400 | 3100 | 250 | 2120 | 185 |

### ● Corrosion resistance metal

1. Nickel
2. Monel
3. Carpenter
4. Hastelloy
5. Titanium


#### Standard Specifications

Diameter : ½"~6"
Material : Housing: Anticorrosive Metal
Element: Anticorrosive Metal
Flange: 304S.S (Lap joint)
Element Fixing : Ring Weld (Removable Element)
Fixing : JIS10K Flange

See N60 series for Dimensions. (P.12)

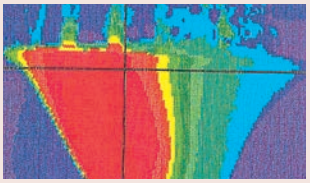
# Homogenization

## Basic Functions

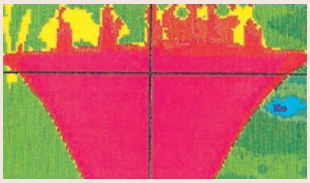
When mixing high viscosity liquids, the roles of the static mixers conversion process and division process are very important.
The Conversion process shuffles the fluids of the cylinder's wall and the center areas. The Division process separates the fluid in half. By repeating this process, the inequalities that occur in the fluid are eliminated.
Because of this, the role of a mixer does not stop at the conventional "mix A and B, but also helps to improve the inequalities related to the degree of viscosity, temperature, concentration, density, flow rate, stagnant time and heat history. Available are the N20 type for synthetic fiber, the Thermo Mixer for extruders, and the Polymer Mixing Nozzle for injection molding.

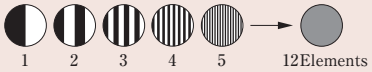
### ■ Effects of Heat Homogenization

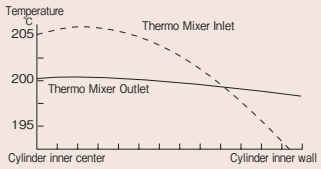
●Without Static Mixer



●With Static Mixer

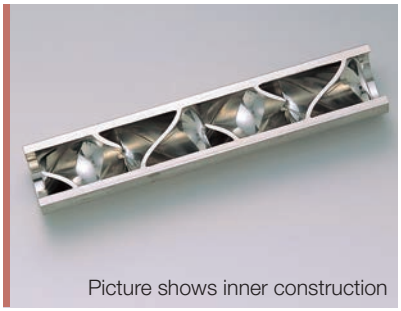





# N20 Series.

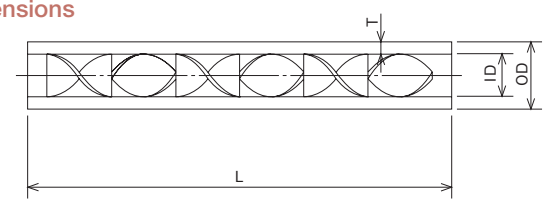
Edge Seal Type
(For Polymer Melting)



Picture shows inner construction

Both the element and housing of the N20 series have a buffed finish. The element is fixed to the housing by an edge seal. Because there is no dead space it is perfect for the homogenization of the molten polymer. This series is mainly used to reduce viscosity and heat irregularities in the synthetic fiber manufacturing process, improve fiber quality and attain more consistent fiber forming or create a special fiber.

### ■ Dimensions




| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | 5 : Sch80 | | | | 7 : Sch160 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Inner Diameter IDmm | Thickness Tmm | Length Lmm | Mass kg | Inner Diameter IDmm | Thickness Tmm | Length Lmm | Mass kg |
| ½-N20-□21-0 | ½" | 21.7 | 14.3 | 3.7 | 140 | 0.3 | — | — | — | — |
| ¾-N20-□21-0 | ¾" | 27.2 | 19.4 | 3.9 | 185 | 0.5 | 16.2 | 5.5 | 155 | 0.5 |
| 1-N20-□21-0 | 1" | 34.0 | 25.0 | 4.5 | 245 | 1.0 | 21.2 | 6.4 | 215 | 1.1 |
| 1¼-N20-□21-0 | 1¼" | 42.7 | 32.9 | 4.9 | 320 | 1.7 | 29.9 | 6.4 | 295 | 1.8 |
| 1½-N20-□21-0 | 1½" | 48.6 | 38.4 | 5.1 | 370 | 2.3 | 34.4 | 7.1 | 335 | 2.7 |
| 2-N20-□21-0 | 2" | 60.5 | 49.5 | 5.5 | 470 | 4.6 | 43.1 | 8.7 | 415 | 5.6 |
| 2½-N20-□21-0 | 2½" | 76.3 | 62.3 | 7.0 | 595 | 9.0 | 57.3 | 9.5 | 550 | 10.3 |
| 3-N20-□21-0 | 3" | 89.1 | 73.9 | 7.6 | 700 | 13.0 | 66.9 | 11.1 | 635 | 15.8 |

### ■ Standard Specifications

Diameter : ½"~3"(3"+ diameter options available.)
Material : 304S.S
Number of Elements : 6 per module
Element Fixing : Edge Seal (No Clearance)
Fixing : Welded on both ends
Finish : Polished #400 equivalent
Housing Schedule : 80, 160

### ■ Model Code Chart

1 – N20 – 5 2 1 – 0 □

- 1 : Diameter
- N20 : Model
- 5 : Housing Schedule — 3: 40, 5: 80, 6: 120, 7: 160
- 2 : Material — 2: 316S.S, 3: 304S.S, 8: 316S.S (Element:316LS.S)
- 1 : Number of Elements — 1: 6, (n): n
- 0 : Edge preparation — S: Yes, □: No

### ■ Sleeve

N20 Series, small diameter type.
Mostly used with synthetic fiber production's spinning packs, pump blocks and so on.

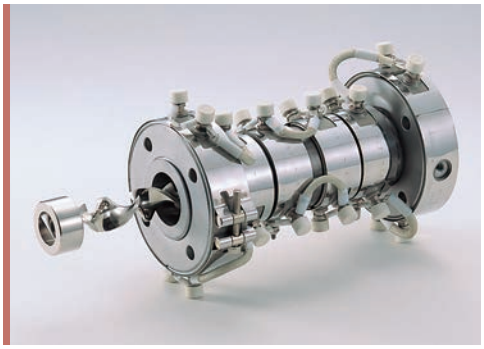
※ Pipe thickness and length is decided by design.

### ■ Spinning Pack & Pump Block

These are edge seal type spinning packs and pump locks that you can directly apply static mixers to.

# TM Series.

## Thermo Mixer (For extruder processing)

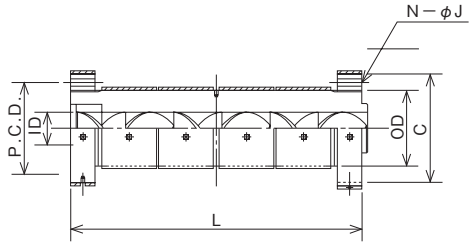


The element has a polished finish. The inner surface of the barrel is plated with hard chrome. This can equalize the distribution of heat during thermo plastic resin meltdown. Installing this thermo mixer with an extrusion mold, allows you to finely control temperatures, so you can reduce variances of polymer's meltdown temperatures (and viscosity) that occur with extractors. This provides better consistent quality of product (Film Production die has been registered for utility model patent).

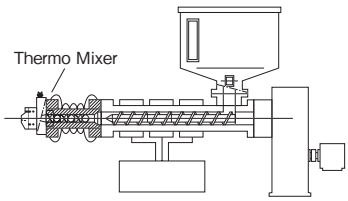
We can customize the installation construction and Dimensions to suit your needs.

PAT.2681716
PAT.H05-042578

### Dimensions




### Installation




### Standard Specifications

Diameter : 1"~4"
Material : Barrel: SCM435
Element: 316LS.S(Ring 316S.S)
Number of Elements : 6
Element Fixing : Ring Weld (Removable Element)
Fixing : Special dimension flange
Finish : Barrel inner surface:
Hard Chrome lated.
Element: Polished #400
Accessories : Band Heater

| Model | Nominal Diameter (ND) | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Length Lmm | Flange | | | | Mass kg |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Outside Diameter (OD) Cmm | P.C.D mm | Number of Holes N | Diameter of Holes Jmm | |
| TM 25-311-1 | 1" | 63.5 | 25.4 | 230 | 114 | 90 | 4 | 11 | 10 |
| TM 40-311-1 | 1½" | 88.9 | 38.1 | 345 | 150 | 120 | 4 | 13 | 20 |
| TM 50-311-1 | 2" | 114.3 | 50.8 | 457 | 178 | 146 | 6 | 13 | 40 |
| TM 65-311-1 | 2½" | 152.4 | 62.8 | 580 | 230 | 195 | 6 | 17.5 | 85 |
| TM 80-311-1 | 3" | 177.8 | 76.2 | 685 | 254 | 215 | 6 | 17.5 | 130 |
| TM 90-311-1 | 3½" | 203.2 | 88.9 | 800 | 300 | 250 | 6 | 19.5 | 190 |
| TM100-311-1 | 4" | 228.6 | 101.6 | 915 | 330 | 280 | 6 | 19.5 | 270 |

### Model Code Chart

TM — 25 (Diameter: 25 1", 40 1½", ⋮, 100 4") — 3 (Type: 1 Element Only, 2 Element+Barrel, 3 Element+Barrel+Band Heater) — 1 (Material: 1 Standard, 2 Special) — 1 (Number of Elements: 1 6, (n) n) — 1 (Joint: 0 Element Only, 1 Standard, 2 Special)

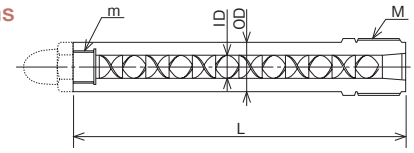
# PM Series.

## Polymer Mixing Nozzle (For Injector Processing)

This Polymer Mixer Nozzle is applied equipment for the static mixer, developed for injection molding. The inner surfaces of the element and housing have a polished finish. You can simply upgrade to this unit by swapping these polymer mixing nozzles with the nozzles you are currently using. This will result in more consistent quality and help save on coloring agents.

We can customize the installation construction and Dimensions to suit your needs.

### Dimensions




| Model | Screw size M | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Screw size M | Mass kg |
|---|---|---|---|---|---|---|---|
| PM1012 | M30 | 24 | 10 | 7.0 | 180 | M20 | 0.7 |
| PM1512 | M42 | 36 | 15 | 10.5 | 240 | M24 | 1.2 |
| PM2012 | M56 | 46 | 20 | 13.0 | 310 | M30 | 3.5 |
| PM2512 | M64 | 55 | 25 | 15.0 | 370 | M36 | 6.0 |
| PM3012 | M75 | 65 | 30 | 17.5 | 440 | M42 | 10.5 |
| PM3512 | M85 | 75 | 35 | 20.0 | 500 | M48 | 15.0 |

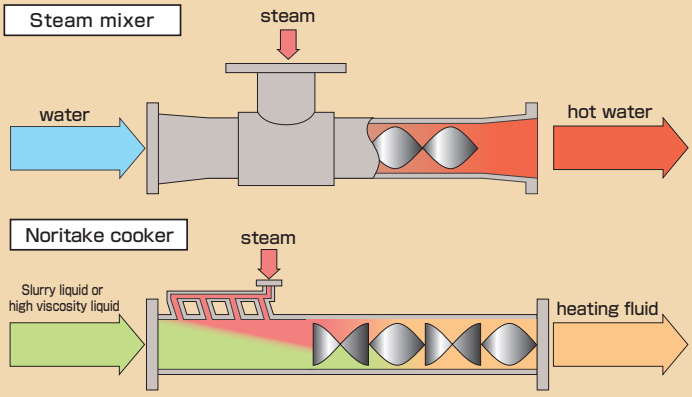
### Model Code Chart

PM — 10 (Diameter (mm): 10 10, 15 15, ⋮, 35 35) — 12 (Number of Elements: 12 12, (n) n)

# Basic Functions

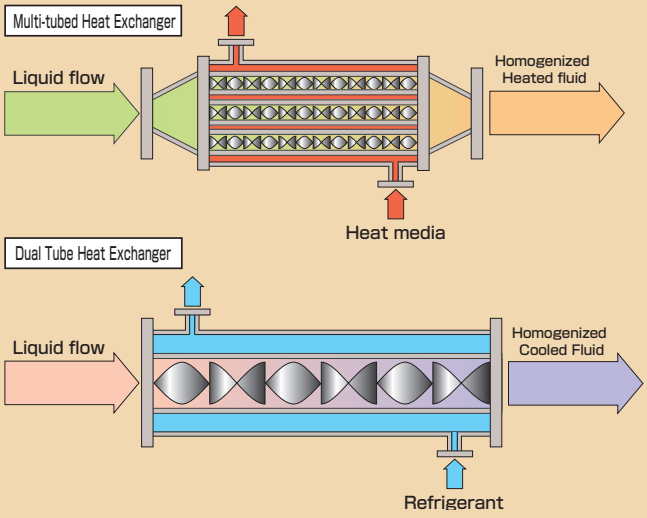
## Direct Heating

This is a process in which steam is used directly on the liquid being processed, in order to heat it. The static mixer's dispersion effect consistently and finely disperses the steam and completes condensing it almost instantly. Not only is direct heating possible with low viscosity liquids (like water) and high viscosity liquids, but units for a large range of viscosities are available. This allows consistent, direct heat application and eliminates the "hammering" of conventional systems, which resulted in inconsistent quality, and difficulty in controlling temperatures.
We offer Steam Mixers, the Noritake Cooker, the SM De- Super Heater and others.



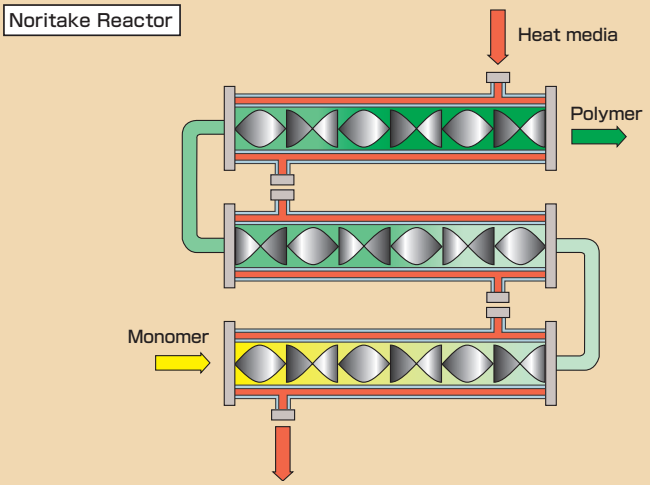

## Heat Exchangers

By using a Static Mixer in a heat exchanger tube, the fluid inside the tube that is heated or cooled by the tube wall is quickly interchanged with the fluid of the middle of the tube, homogenizing the fluid. This smoothes and quickens the heating / cooling process, improving quality. As a result, the overall coefficient of heat transfer of the heat exchanger is drastically improved. Dual Tube and multi-tube types with large heat transfer surfaces are available.



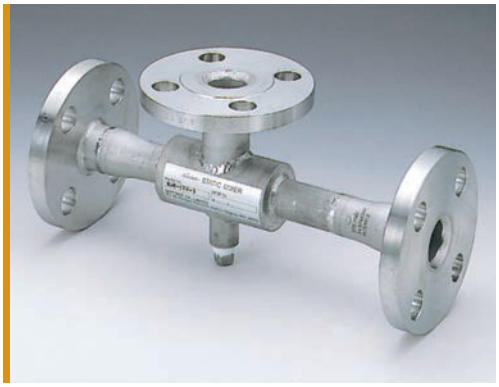

## Reaction

Through the stirring effect of the static mixer, the polymer turns to piston flow and can set the reaction time. Also, you can easily control the temperatures during endothermal and exothermic reactions, through the superior heat transfer characteristics. Therefore, uniformed continuous reaction is possible.
Mostly used in mass polymerization processes.



# SME-V Series.

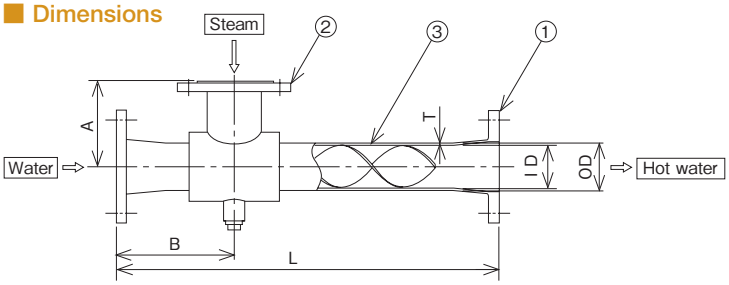
## Steam Mixer (For heating liquids)



The steam mixer heats liquid by directly injecting steam into it. It is made up of a steam injection nozzle and a spiral element for diffusion and condensation. Because it uses a spiral element to directly diffuse and condense the steam into the liquid, it uses all of the heat capacity of the steam and as a result, guarantees a stable liquid temperature. Also, it gets a significant reduction of vibration and noise that usually occurs during steam condensation with a tank heating system.
It is mainly used to produce hot water as a thermal catalyst for reactor and thermal exchanger jackets and for cleaning. Steam can be used within a range of 0~ Max.kg/h.

PAT.4648792

### Dimensions




### Standard Specifications

Diameter : ¾"~12"
Material : 304S.S
Number of Elements : 2 (equivalent)
Element Fixing : Welded on both ends
Fixing : Flange
(Water, Hot water side
JIS10K-FF, Steam side JIS10K-RF)

| Model | Nominal Diameter (ND) ① | ② | ③ | Outside Diameter(OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Amm | Bmm | Steam kg/h | Hot water m³/h | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SME-V 20-3 | ¾" | ¾" | ½" | 21.7 | 16.7 | 2.5 | 230 | 70 | 88 | 0~150 | 0.48~2.36 | 4 |
| SME-V 25-3 | 1" | 1" | ¾" | 27.2 | 22.2 | 2.5 | 254 | 80 | 105 | 0~250 | 0.84~4.18 | 6 |
| SME-V 40-3 | 1½" | 1½" | 1¼" | 42.7 | 36.7 | 3.0 | 379 | 110 | 133 | 0~570 | 2.28~11.4 | 10 |
| SME-V 50-3 | 2" | 2" | 1½" | 48.6 | 42.6 | 3.0 | 439 | 120 | 147 | 0~930 | 3.08~15.4 | 11 |
| SME-V 65-3 | 2½" | 2½" | 2" | 60.5 | 53.5 | 3.5 | 529 | 120 | 171 | 0~1,500 | 4.85~24.3 | 16 |
| SME-V 80-3 | 3" | 3" | 2½" | 76.3 | 69.3 | 3.5 | 632 | 140 | 194 | 0~2,000 | 8.14~40.7 | 20 |
| SME-V100-3 | 4" | 4" | 3½" | 101.6 | 93.6 | 4.0 | 804 | 160 | 233 | 0~3,500 | 14.9~74.3 | 34 |
| SME-V125-3 | 5" | ※ | 4" | 114.3 | 106.3 | 4.0 | 939 | 180 | 277 | 0~5,400 | 19.2~95.8 | (58) |
| SME-V150-3 | 6" | ※ | 5" | 139.8 | 129.8 | 5.0 | 1104 | 220 | 314 | 0~7,600 | 28.6~143 | (87) |
| SME-V200-3 | 8" | ※ | 6" | 165.2 | 155.2 | 5.0 | 1275 | 250 | 350 | 0~13,400 | 40.8~204 | (116) |
| SME-V250-3 | 10" | ※ | 8" | 216.3 | 203.3 | 6.5 | 1615 | 280 | 430 | 0~20,800 | 70.1~350 | (172) |
| SME-V300-3 | 12" | ※ | 10" | 267.4 | 254.4 | 6.5 | 1971 | 320 | 513 | 0~27,800 | 110~549 | (255) |

We can modify designs of Models V125 and above, to suit conditions of your use. (※) We can also modify and design large diameter models larger than V300. Steam Pressure: 0.5MPaG

### Model Code Chart

SME – V – 20 – 3

- SME: Model
- V: Model
- 20: Diameter (20 ¾", 25 1", ⋮, 300 12")
- 3: Material (3 304S.S, 3S 316S.S, 3SL 316LS.S)

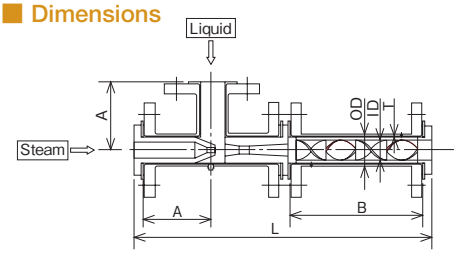
## Chemically Resistant

Because exposed parts incorporate fluorine resin, these are particularly suited for heating corrosive liquids directly with steam. These are mainly used in the heating process of dilute sulphuric acid.

### Standard Specifications

Diameter : ½"-3" (3"+ diameter options available.)
Material : Housing : CS/ Fluorine resin lining.
Nozzle/Diffuser : Reinforced Fluorine resin
Element : Reinforced Fluorine resin
Number of Elements : 4
Element Fixing : Ring
Fixing : JIS10K Flange

### Dimensions




| Model | Nominal Diameter (ND) | Steam kg/h | Hot water m³/h | Outside Diameter(OD) ODmm | Mixer Inner diameter IDmm | Lining Thickness Tmm | Amm | Bmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| SME-20-5 | ¾" | ~ 35 | 0.3~0.8 | 27.2 | 12 | 1.5 | 80 | 79 | 266 | 5.0 |
| SME-25-5 | 1" | ~ 75 | 0.6~2.0 | 34.0 | 18 | 1.5 | 89 | 118 | 332 | 8.0 |
| SME-40-5 | 1½" | ~ 250 | 1.8~5.0 | 48.6 | 30 | 2.0 | 102 | 194 | 440 | 9.7 |
| SME-50-5 | 2" | ~ 340 | 3.0~9.0 | 60.5 | 40 | 2.0 | 114 | 264 | 534 | 11.5 |
| SME-65-5 | 2½" | ~ 420 | 5.5~15 | 76.3 | 50 | 2.0 | 130 | 324 | 641 | 17.3 |

Steam Pressure: 0.5MPaG

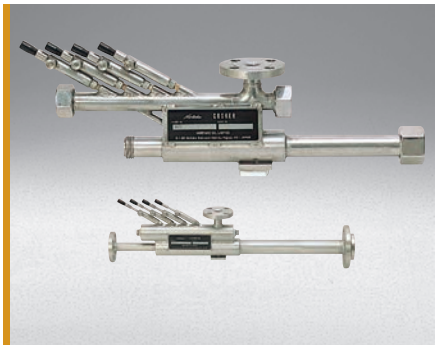
### Model Code Chart

SME – 20 – 5

- SME: Model
- 20: Diameter (20 ¾", 25 1", ⋮, 65 2½")
- 5: Material (5 Fluorine Resin Element + Fluorine Resin Lined Tubing)

# NST Series.

## Noritake Cooker
(For Heating High Viscosity Fluids)



The Noritake Cooker is ideal for heating highly viscous liquids directly with steam. The cooker consists of a steam header, injection nozzles and a dispersion section, static mixer. The steam injected into the high viscosity liquid is forcefully agitated so that compression and heating occur in an instant. Therefore, it can be taken to the target temperature instantly. In addition, it can be used with starch-like materials that quickly gain viscosity when heated. These units are widely used in the food, paper pulp and chemical industries. Finally, vibrations and sounds created during steam condensation processes are virtually eliminated. A liquid with a uniform distribution of temperature is quickly attained and temperature control is both simple and precise.
The simple construction of this series allows for simple CIP and disassembled cleaning.

PAT.1485351
PAT.1543109

## Standard Specifications

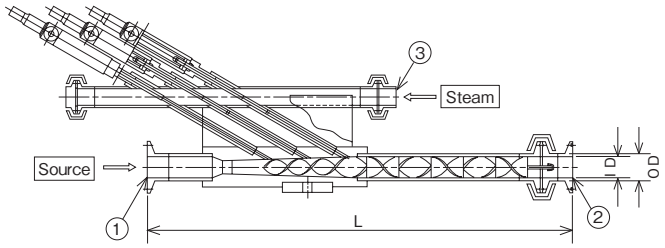
Diameter : ½"-3" (3"+ diameter options available. )
Material : Unit : 304S.S
Element : 316LS.S
Number of Elements : 6
Element Fixing : Welded Ring (Removable Element)
Fixing : Ferrule IDF ScrewNut, JIS10K Flange
Finish : Sanitary finish

## Model Code Chart

NST−D 50 − 3 / F(V)

| Model | Diameter | Material | Fitting & Valve |
|---|---|---|---|
| | 15 ½" | 3 304S.S | F(V) Ferrule, W/ on-off valve |
| | 20 ¾" | 3S 316S.S | IDF(V) IDF Screw & Nut, W/ on-off valve |
| | 25 1" | 3SL 316LS.S | V JIS10K Flange, W/ on-off valve |
| | ⋮ | 7 Other | JIS10K Flange, WO/ on-off valve |
| | 80 3" | | |

## Dimensions




| Model | ① Source In | ② Processed fluid Out | ③ Steam In JIS10K(IDF) | Capacity L/h | Steam kg/h | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| NST-D15-3 /F (V) | 1S | 1S | ½" (1S) | 50 ~ 120 | ~22 | 21.7 | 14.3 | 3.7 | 320 | 4 |
| NST-D20-3 /F (V) | 1S | 1S | ½" (1S) | 100 ~ 400 | ~75 | 27.2 | 19.4 | 3.9 | 375 | 5 |
| NST-D25-3 /F (V) | 1S | 1¼S | ¾" (1S) | 200 ~ 600 | ~110 | 34.0 | 25.0 | 4.5 | 470 | 7 |
| NST-D40-3 /F (V) | 1½S | 2S | 1" (1½S) | 400 ~ 1500 | ~280 | 48.6 | 41.2 | 3.7 | 590 | 12 |
| NST-D50-3 /F (V) | 1½S | 2½S | 1½" | 700 ~ 3000 | ~560 | 60.5 | 52.7 | 3.9 | 755 | 18 |
| NST-D65-3 /F (V) | 2½S | 3S | 2" | 1200 ~ 5000 | ~930 | 76.3 | 65.9 | 5.2 | 910 | 25 |
| NST-D80-3 /F (V) | 2½S | 3½S | 2½" | 2000 ~ 7000 | ~1300 | 89.1 | 78.1 | 5.5 | 1200 | 32 |

pressure:0.5MPaG

# NST Series.

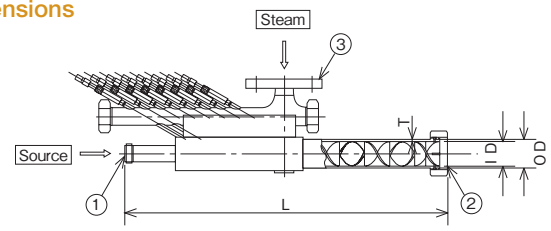
Noritake Cooker
(Large flow type)

This is our large capacity Noritake Cooker. It is mainly used in the starching process of the paper pulp industry and starch liquefaction process of carbohydrate solutions.

## Standard Specifications

Diameter : 2"~5" (5"+ diameter orders possible)
Material : Unit : 304S.S Element : 316LS.S
Number of Elements : 6
Element Fixing : Ring
Fixing : JIS10K Flange

## Dimensions




## Model Code Chart

NST – D [100] – [3] / [V]

- Model
- Diameter: 50 2" / 65 2½" / 80 3" / 100 4" / 120 5"
- Material: 3 304S.S / 3S 316S.S / 3SL 316LS.S / 7 Other
- Fitting & Valve: Flange, WO/ on-off valve / V Flange, W/ on-off valve

| Model | ① Source In | ② Processed fluid Out | ③ Steam In JIS10K(IDF) | Capacity L/h | Steam kg/h | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| NST-D50-3/V | 1½" | 2" | 1½" | 700 ~ 3000 | ~560 | 60.5 | 52.7 | 3.9 | (755) | (18) |
| NST-D65-3/V | 2" | 2½" | 2" | 1200 ~ 5000 | ~930 | 76.3 | 65.9 | 5.2 | (910) | (25) |
| NST-D80-3/V | 2½" | 3" | 2½" | 2000 ~ 7000 | ~1300 | 89.1 | 78.1 | 5.5 | (1200) | (32) |
| NST-D100-3/V | 3" | 4" | 3" | 3000 ~10000 | ~1800 | 114.3 | 102.3 | 6 | (1500) | (50) |
| NST-D125-3/V | 4" | 5" | 4" | 4000 ~16000 | ~2300 | 139.8 | 126.6 | 6.6 | (2000) | (80) |

*Length and weight differ depending on application. *Source amount and steam amount is just a reference and will differ depending on application. pressure:0.5MPaG

# DSM Series.

SM De-Super Heater
(For cooling steam <refrigerant>)

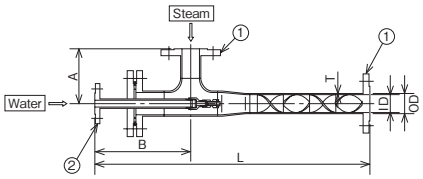
SM De-Super Heater is a cooling device that injects refrigerated water into superheated steam to reduce its temperature. The SM De-superheater consists of a coolant spray nozzle and static mixer which takes care of agitation and evaporation. The forced stirring effect ensures an accurate control of the steam temperature.

## Standard Specifications

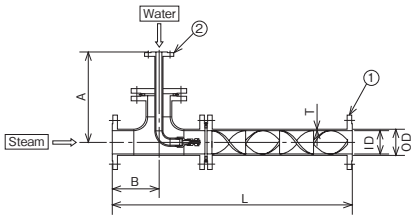
Diameter : 1"~8"
Material : Number of Elements : 4
Element Fixing : Welded on both sides
Fittings : JIS10K Flange

## Dimensions

### DSM-L (Small Capacity Type)




### DSM (Standard) Type




## Model Code Chart

DSM – [ ] [150] – [3]

- Model
- Nozzle Type: (blank) Standard / L Small capacity
- Size: 25 1" / 40 1½" / : / 200 8"
- Material: 2 Carbon Steel / 3 304S.S / 3S 316S.S(Element: 316LS.S) / 3SL 316LS.S / 7 Other

## DSM-L(Small Capacity Type)

| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Steam kg/h | Outside Diameter(OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Bmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| DSM-L25-3 | 1" | ½" | ~ 250 | 34.0 | 27.2 | 3.4 | 110 | 202 | 500 | 8 |
| DSM-L40-3 | 1½" | ½" | ~ 600 | 48.6 | 41.2 | 3.7 | 130 | 227 | 650 | 12 |
| DSM-L50-3 | 2" | ¾" | ~1000 | 60.5 | 52.7 | 3.9 | 135 | 237 | 770 | 16 |

pressure:0.5MPaG

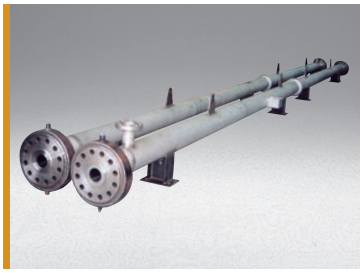
## DSM(Standard Type)

| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Steam kg/h | Outside Diameter(OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | Amm | Bmm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| DSM- 65-3 | 2½" | ¾" | ~ 1500 | 76.3 | 65.9 | 5.2 | 280 | 140 | 722 | 20 |
| DSM- 80-3 | 3" | ¾" | ~ 2200 | 89.1 | 78.1 | 5.5 | 310 | 160 | 822 | 30 |
| DSM-100-3 | 4" | ¾" | ~ 4000 | 114.3 | 102.3 | 6.0 | 340 | 190 | 1032 | 50 |
| DSM-125-3 | 5" | 1" | ~ 6000 | 139.8 | 126.6 | 6.6 | 370 | 220 | 1252 | 75 |
| DSM-150-3 | 6" | 1" | ~ 8500 | 165.2 | 151.0 | 7.1 | 410 | 240 | 1482 | 120 |
| DSM-200-3 | 8" | 1" | ~15000 | 216.3 | 199.9 | 8.2 | 470 | 290 | 1980 | 160 |

pressure:0.5MPaG

# SMHED Series.

SM Double Shell and Tube Heat Exchanger



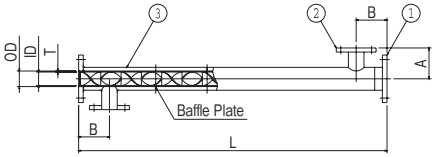
Mainly used for cooling of resins in the chemical industry and polymer cooling in the synthetic fiber industry.

## Standard Specifications

Material : 304S.S Acid cleaned finish
Element Fixing : Both end weld or Edge seal*1 or removable (Fixed Ring:2)
Fixing : JIS 10K Flange

*1 The entire element is fixed to the heat exchanger tube.
*2 The ring installed on the fluid entrance side element is fixed by being sandwiched by a flange.

## Dimensions




## Model Code Chart

SMHED – 25 I (29)

- Model: SMHED
- Diameter: 25 (1"), 40 (1½"), 50 (2"), 65 (2½"), 80 (3")
- Element Type: 49 Both end weld, E Edge Seal, A Removable Element
- Number of Elements: 29, 19, 15, 12, 10

| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Number of Elements | Outside Diameter(OD) ODmm | Inner Diameter(ID) IDmm | Thickness Tmm | Amm | Bmm | Length Lmm | Jacket Pipe ③ | Heating area m² | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMHED-25 I (29) | 2" | 1" | 29 | 34.0 | 27.2 | 3.4 | 120 | 120 | 1200 | 2" Sch20S | 0.12 | 15 |
| SMHED-40 I (19) | 2½" | 1½" | 19 | 48.6 | 41.2 | 3.7 | 120 | 120 | 1200 | 2½" Sch20S | 0.17 | 23 |
| SMHED-50 I (15) | 3" | 2" | 15 | 60.5 | 52.7 | 3.9 | 120 | 120 | 1200 | 3" Sch20S | 0.22 | 29 |
| SMHED-65 I (12) | 4" | 2" | 12 | 76.3 | 65.9 | 5.2 | 130 | 120 | 1200 | 4" Sch20S | 0.27 | 38 |
| SMHED-80 I (10) | 5" | 2" | 10 | 89.1 | 78.1 | 5.5 | 150 | 120 | 1200 | 5" Sch20S | 0.32 | 51 |

# STHE Series.

SM Multi Shell and Tube Heat Exchanger

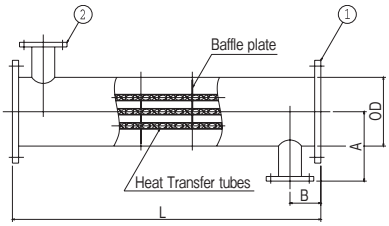
The overall coefficient of heat transfer is 3~5 times greater, which considerably reduces heating time, making this unit ideal for polymeric heating, which is vulnerable to heat history.
Picture shows unit before installing element and does not show removability.

## Standard Specifications

Material : 304S.S Acid cleaned finish
Heat exchanger tube : Outer diameter : 25,4mm/ Inner diameter 21,4mm/ Thickness 2mm
Element Fixing : Both end weld or Edge seal or removable (Stopper Plate type)
Fixing : JIS 10K Flange

* Install by matching the perforated plate with the holes in the heat transfer tubes in the reducers on both ends.

## Dimensions




## Model Code Chart

STHE – 17.5 I (19)

- Model: STHE
- Heating area (m²): 1.75, 3.41, 5.61, 11.0, 13.7
- Element Type: I Both end weld, E Edge Seal, A Removable Element
- Number of Heat exchanger tubes: 19, 37, 61, 121, 151

| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Number of Elements | ODmm | Amm | Bmm | Number of Heat exchanger tubes | Length Lmm | Heating area m² | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| STHE-1.75 I (19) | 6" | 3" | 36 | 165.2 | 220 | 120 | 19 | 1200 | 1.75 | 85 |
| STHE-3.41 I (37) | 10" | 3" | 36 | 267.4 | 270 | 120 | 37 | 1200 | 3.41 | 181 |
| STHE-5.61 I (61) | 12" | 3" | 36 | 318.5 | 300 | 120 | 61 | 1200 | 5.61 | 292 |
| STHE-11.0 I (121) | 16" | 4" | 36 | 418 | 350 | 160 | 121 | 1200 | 11.0 | 522 |
| STHE-13.7 I (151) | 18" | 4" | 36 | 468 | 400 | 160 | 151 | 1200 | 13.7 | 652 |

# SMHE Series.

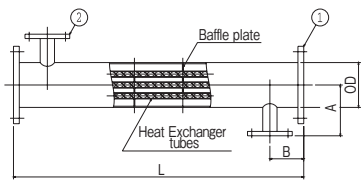
SM Multi Shell and Tube Heat Exchanger (For low viscosity)

This multiple tube heat exchanger implements cost efficient spiral elements. Mainly used in heat exchange of low viscosity liquids. Mainly used in heating and cooling of pure water and heating of shampoo and rinse ingredients (bulk).

## Standard Specifications

Material : 304S.S Acid cleaned finish
Heat exchanger tube : Outer diameter : 10mm/ Inner diameter 8mm/ Thickness 1mm
Element Fixing : Edge seal (Spiral Element)
Fixing : JIS 10K Flange

## Dimensions




## Model Code Chart

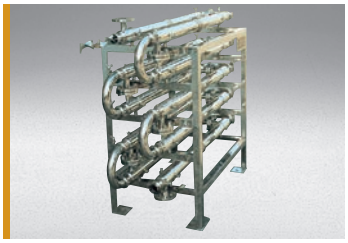
SMHE – 1

- Model: SMHE
- Heating area (m²): 1 0.53, 2 1.2, 3 3.0, 4 5.1, 5 8.2

| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | ODmm | Amm | Bmm | Number of Heat exchanger tubes | Length Lmm | Heating area m² | Mass kg |
|---|---|---|---|---|---|---|---|---|---|
| SMHE-1 | 2½" | 1½" | 76.3 | 130 | 100 | 19 | 930 | 0.53 | 27 |
| SMHE-2 | 4" | 2" | 114.3 | 150 | 110 | 43 | 930 | 1.2 | 41 |
| SMHE-3 | 6" | 3" | 165.2 | 180 | 120 | 109 | 930 | 3.0 | 66 |
| SMHE-4 | 8" | 3" | 216.3 | 230 | 120 | 187 | 930 | 5.1 | 98 |
| SMHE-5 | 10" | 3" | 267.4 | 250 | 120 | 295 | 930 | 8.2 | 145 |

# SMHEDN/S Series.

SM Double Shell and Tube Heat Exchanger
(Polish for parts exposed to liquids)

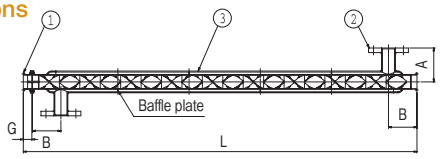


Parts that get exposed to liquids are all covered with a sanitary finish, making CIP cleaning possible. The element is removable for easy disassembly cleaning.

## Standard Specifications

Material : 304S.S (Polished inner walls)
(option: Electropolishing)
Element Fixing : Removable (Weld to short tube)
Fittings : Ferrule

## Dimensions




| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Number of Elements | Outside Diameter (OD) ODmm | Inner Diameter (ID) IDmm | Thickness Tmm | A mm | B mm | G mm | Length Lmm | Jacket Pipe ③ | Heating area m² | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMHEDN-25A(38)/S | 1S | ¾" | 38 | 25.4 | 23.0 | 1.2 | 119 | 100 | 30 | 1382 | 1¼" Sch20 | 0.1 | 9 |
| SMHEDN-40A(24)/S | 1½S | 1" | 24 | 38.1 | 35.7 | 1.2 | 119 | 100 | 30 | 1382 | 2" Sch20 | 0.15 | 13 |
| SMHEDN-50A(18)/S | 2S | 1½" | 18 | 50.8 | 47.8 | 1.5 | 119 | 100 | 30 | 1382 | 2½" Sch20 | 0.2 | 18 |
| SMHEDN-65A(14)/S | 2½S | 2" | 14 | 63.5 | 59.5 | 2.0 | 119 | 100 | 35 | 1387 | 3" Sch20 | 0.25 | 25 |
| SMHEDN-80A(12)/S | 3S | 2" | 12 | 76.3 | 72.3 | 2.0 | 119 | 100 | 35 | 1387 | 4" Sch20 | 0.3 | 35 |

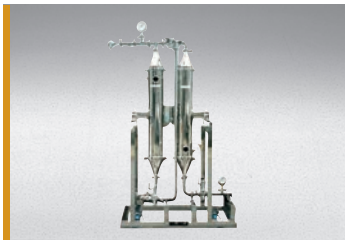
## Model Code Chart

SMHEDN – [25] A ([38]) / [S]

- Model: SMHEDN
- Diameter: 25 = 1S, 40 = 1½S, 50 = 2S, 65 = 2½S, 80 = 3S
- Element Type: A = Removable Element
- Number of Elements: 38, 24, 18, 14, 12
- Finish and Materials: S = Inner polish, 304S.S; SL = Inner polish, 316LS.S

# STHE/S Series.

SM Multi Shell and Tube Heat Exchanger
(Polish for parts exposed to liquids)

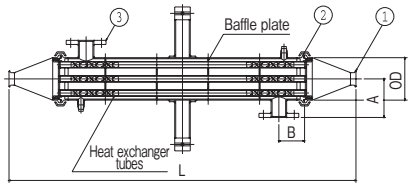


While conventional plate-type exchangers could not process sauces which had solids in them, this unit can. It also works with high viscosity materials. It supports CIP cleaning and is easy to disassemble for cleaning as well.

## Standard Specifications

Material : 304S.S (Polished inner walls)
Heat exchanger tube : Outer diameter : 25,4mm/ Inner diameter 21,4mm/ Thickness 2mm
Element Fixing : Removable (Stopper Plate type)
Fittings : Ferrule

## Dimensions




| Model | Nominal Diameter (ND) ① | Nominal Diameter (ND) ② | Nominal Diameter (ND) ③ | Number of Elements | ODmm | Amm | Bmm | Number of Heat exchanger tubes | Length Lmm | Heating area m² | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STHE-1.3A (19) /S | 2S | 6" | 2" | 27 | 165.2 | 150 | 100 | 19 | 1350 | 1.3 | 81 |
| STHE-2.2A (31) /S | 2S | 8" | 2" | 27 | 216.3 | 150 | 100 | 31 | 1500 | 2.2 | 133 |
| STHE-3.9A (61) /S | 3S | 12" | 2½" | 24 | 318.5 | 230 | 100 | 61 | 1650 | 3.9 | 230 |

## Model Code Chart

STHE – [1.3] [A] ([19]) / [S]

- Model: STHE
- Heating area (m²): 1.3, 2.2, 3.9
- Element Type: A = Removable Element
- Number of Heat exchanger tubes: 19, 31, 61
- Finish and Materials: S = Inner polish, 304S.S; SS = Inner polish, 316S.S; SL = Inner polish, 316LS.S

# Noritake Reactors

Tubular reactor

This unit is mainly used in the polymerization process of polymethyl methacrylate and polyurethane elastic fiber or the thermal decomposition reaction of polypropylene, mallein reaction of resins and sulphonation reaction.

## Model Code Chart

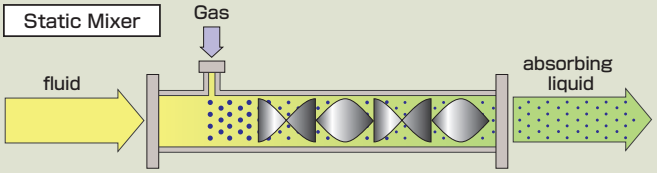
[2] ([3]) – N [10] – [3] [3] [1] – [1]

- Diameter: 2
- Jacket side diameter: 3
- Model: 10 = Fixed element type; 60 = Removable Element type
- Housing Schedule: 3 = 40; 5 = 80
- Material: 1 = Carbon Steel; 2 = 316S.S; 3 = 304S.S; 8 = 316S.S (Element: 316LS.S)
- Number of Elements: 1 = 6; 2 = 12; 3 = 18; (n) = n
- Joint: 0 = No; 1 = JIS; 2 = ANSI; 3 = JPI; 4 = Other

●Noritake Reactors can be designed and built to suit your applications.

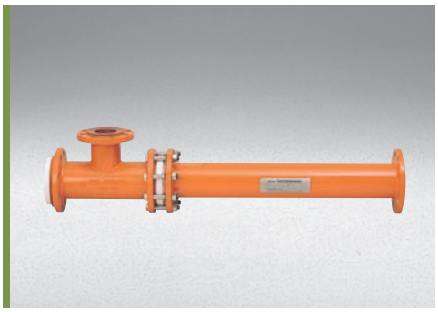
## Basic Functions

The process of absorbing gas into a liquid requires you increase the absorptivity of the gas by dispersing the gas into small bubbles and increasing the interfacial contact area. The stirring effect of the static mixer makes the bubbles finer and disperses them uniformly. Moreover, continuous elements repeat the dispersion process, renewing the gas-liquid interfacial area. This creates more efficient gas absorption.
The general use static mixer supports a liquid to gas ratio of up to 1:2.5.




# SMD Series.

Dispersion Mixer
(Gas-Liquid & Liquid-Liquid Disperser)



A dispersion mixer is a gas-liquid and liquid-liquid extraction device that combines a static mixer and an injector. The injector consists of a nozzle and diffuser.
When used for the dispersion of gas-liquid, you can produce more minute and uniform bubbles. When used for the dispersion of liquid-liquid, you can produce finer and more uniformed droplets. This series is used mostly in the chlorine bleaching process of pulp, the manufacturing process of hypochlorite, the dilution process of sulfuric acid and the cleaning and extraction process of grease.

PAT.H8-295504

### Model Code Chart

SMD – 60 – 5

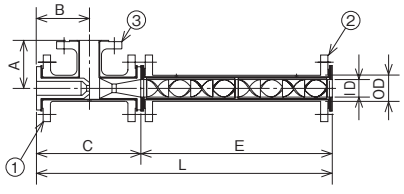
- Model: SMD
- Diameter: Ceramics (Inner Diameter (ID)mm) / 304S.S·316S.S (Nominal Diameter (ND))
  - 12 / 15 ½"
  - 30 / 20 ¾"
  - 80 / 100 4"
- Material
  - 5: Ceramics Element+fluorine resin lined pipe
  - 3: 304S.S
  - 3S: 316S.S(Element:316LS.S)

### Standard Specifications

| | SMD- □ -5 | SMD- □ -3 |
|---|---|---|
| Material | Housing : CS/ Fluorine Resin Lining | : 304S.S |
| | Element : Ceramics | : 304S.S |
| | Nozzle & Diffuser : Fluorine resin (PTFE) | : 304S.S |
| Number of Elements | : 8 or 6 | : 8 |
| Element Fixing | : Rings on both ends | : Welded Ring |
| Fixing | : JIS 10K Flange | : JIS 10K Flange |

### Dimensions

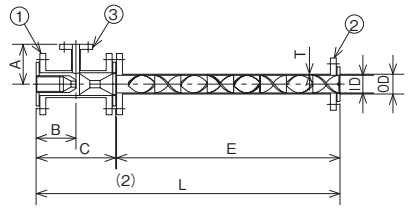
#### SMD-□-5 Type




| Model | Nominal Diameter (ND) ①② | Number of Elements | Outside Diameter(OD) ODmm | Inner Diameter(ID) IDmm | Lining thickness Tmm | Amm | Bmm | Cmm | Emm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SMD-12-5 | ¾" | 8 | 27.2 | 12 | 1.5 | 80 | 87 | 174 | 170 | 344 | 7 |
| SMD-30-5 | 1½" | 8 | 48.6 | 30 | 2.0 | 102 | 114 | 228 | 365 | 593 | 18 |
| SMD-38-5 | 2" | 8 | 60.5 | 38 | 2.0 | 114 | 126 | 252 | 460 | 712 | 25 |
| SMD-60-5 | 3" | 8 | 89.1 | 60 | 2.0 | 140 | 157 | 314 | 756 | 1070 | 45 |
| SMD-80-5 | 4" | 6 | 114.3 | 80 | 2.0 | 165 | 185 | 370 | 781 | 1151 | 65 |

Size of flange ③ is decided by the conditions of the flow

#### SMD-□-3 Type

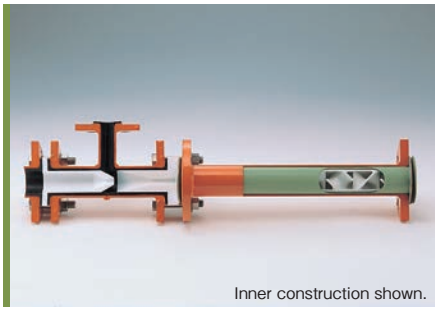



| Model | Nominal Diameter (ND) ① | ② | Outside Diameter(OD) ODmm | Inner Diameter(ID) IDmm | Thickness Tmm | Amm | Bmm | Cmm | Emm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SMD- 15-3 | ¾" | ½" | 21.7 | 16.1 | 2.8 | 80 | 80 | 160 | 210 | 372 | 5 |
| SMD- 20-3 | 1" | ¾" | 27.2 | 21.4 | 2.9 | 90 | 90 | 180 | 275 | 457 | 7 |
| SMD- 25-3 | 1½" | 1" | 34.0 | 27.2 | 3.4 | 100 | 100 | 200 | 350 | 552 | 9 |
| SMD- 40-3 | 2" | 1½" | 48.6 | 41.2 | 3.7 | 115 | 115 | 230 | 520 | 752 | 12 |
| SMD- 50-3 | 2½" | 2" | 60.5 | 52.7 | 3.9 | 120 | 120 | 240 | 670 | 912 | 15 |
| SMD- 65-3 | 3" | 2½" | 76.3 | 65.9 | 5.2 | 130 | 130 | 260 | 830 | 1092 | 20 |
| SMD- 80-3 | 4" | 3" | 89.1 | 78.1 | 5.5 | 140 | 140 | 300 | 980 | 1282 | 35 |
| SMD-100-3 | 5" | 4" | 114.3 | 102.3 | 6.0 | 150 | 150 | 320 | 1280 | 1602 | 70 |

Size of flange ③ is decided by the conditions of the flow

# WEM Series.

Water Jet Mixer
(Gas-liquid & Liquid-liquid Vacuum Distributor)



Inner construction shown.

This Water Jet Mixer is a gas-liquid and liquid-liquid distributor that combines a dispersion mixer with an added vacuum function.
The WEM series is used in the absorption reaction process of low pressure chlorine gas and the dissolution process of ozone gas and ammonia gas.

PAT.2733781

## Model Code Chart

WEM — 60 — 5

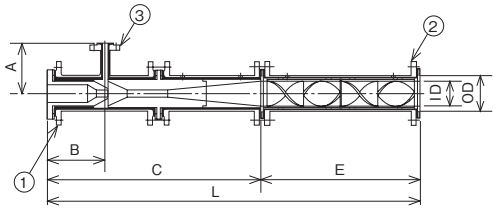
- WEM: Model
- 60: Diameter
  - Ceramics (Inner Diameter (ID)mm): 12 = 12; 30 = 30; ⋮; 100 = 100
  - 304, 316S.S (Nominal Diameter (ND)): 15 = ½"; 20 = ¾"; ⋮; 100 = 4"
- 5: Material
  - 5 = Ceramics Element+fluorine resin lined pipe
  - 3 = 304S.S
  - 3S = 316S.S(Element:316LS.S)

## Standard Specifications

| | WEM- □ -5 | WEM- □ -3 |
|---|---|---|
| Material | Housing : CS/ Fluorine Resin Lining | : 304S.S |
| | Element : Ceramics | : 304S.S |
| | Nozzle & Diffuser : Fluorine resin (PTFE) | : 304S.S |
| Number of Elements | : 4 | : 4 |
| Element Fixing | : Rings on both ends | : Welding |
| Fixing | : JIS 10K-FF Flange | : JIS 10K-FF Flange |

## Dimensions

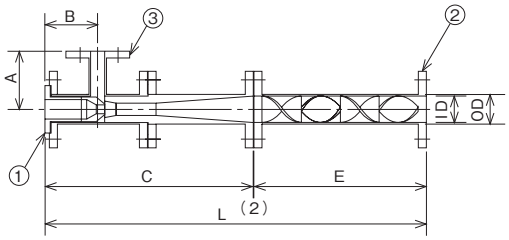
### ● WEM-□-5 Type




| Model | Flange ①② | Outside Diameter(OD) ODmm | Inner Diameter(ID) IDmm | Lining thickness Tmm | Amm | Bmm | Cmm | Emm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| WEM- 12-5 | ¾" | 21.4 | 12 | 1.5 | 80 | 87 | 252 | 95 | 347 | 7 |
| WEM- 30-5 | 1½" | 48.6 | 30 | 2.0 | 102 | 114 | 390 | 205 | 595 | 18 |
| WEM- 38-5 | 2" | 60.5 | 38 | 2.0 | 114 | 126 | 464 | 250 | 714 | 25 |
| WEM- 60-5 | 3" | 89.1 | 60 | 2.0 | 140 | 157 | 606 | 406 | 1072 | 45 |
| WEM- 80-5 | 4" | 114.3 | 80 | 2.0 | 165 | 185 | 630 | 526 | 1156 | 65 |
| WEM-100-5 | ①4"②5" | 139.8 | 100 | 3.0 | 165 | 185 | 715 | 660 | 1375 | 90 |

Size of flange ③ is decided by the conditions of the flow.
C, L dimensions are shown in chart as a reference.

### ●WEM-□-3 Type




| Mode | Flange ①② | Outside Diameter(OD) ODmm | Inner Diameter(ID) IDmm | Thickness Tmm | Amm | Bmm | Cmm | Emm | Length Lmm | Mass kg |
|---|---|---|---|---|---|---|---|---|---|---|
| WEM- 15-3 | ½" | 21.7 | 16.1 | 2.8 | 100 | 59 | 181 | 110 | 293 | 5 |
| WEM- 20-3 | ¾" | 27.2 | 21.4 | 2.9 | 100 | 69 | 216 | 145 | 363 | 7 |
| WEM- 25-3 | 1" | 34.0 | 27.2 | 3.4 | 110 | 79 | 271 | 180 | 453 | 9 |
| WEM- 40-3 | 1½" | 48.6 | 41.2 | 3.7 | 120 | 89 | 371 | 270 | 643 | 12 |
| WEM- 50-3 | 2" | 60.5 | 52.7 | 3.9 | 120 | 109 | 481 | 350 | 833 | 15 |
| WEM- 65-3 | 2½" | 76.3 | 65.9 | 5.2 | 120 | 119 | 561 | 440 | 1003 | 20 |
| WEM- 80-3 | 3" | 89.1 | 78.1 | 5.5 | 130 | 139 | 691 | 500 | 1193 | 35 |
| WEM-100-3 | 4" | 114.3 | 102.3 | 6.0 | 150 | 159 | 681 | 650 | 1333 | 70 |

Size of flange ③ is decided by the conditions of the flow.
C, L dimensions are shown in chart as a reference.

# Injection tees

## Inlet

### Standard Specifications

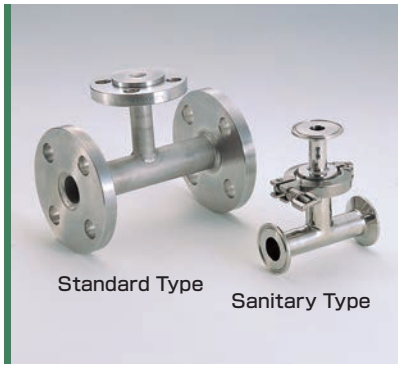
Material: 304 S.S, Ferrule
Fixing: JIS 10K Flange

### Model Code Chart

- When installed with a Static Mixer. A "/T" is added to the end of the Static Mixers Model Number. Example) 1-N60-331-1/T
- Inlet only

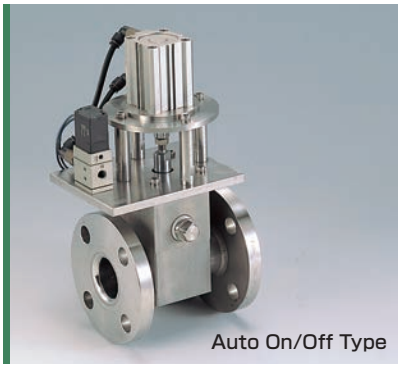
T □ – □ / 15 – 3 / S

- T: Model
- □: Auto On/Off — A: Yes; □: No
- □: Inlet Diameter
- 15: Diameter
  - Standard: 15 ½", 20 ¾", … 200 8"
  - Sanitary: 25 1S, 40 1½S, … 80 3S
  - Auto On/Off: 25 1", 40 1½", … 350 14"
- 3: Material — 2: 316S.S; 3: 304S.S
- S: Finish — □: No; S: polish




These Injection tees are inlets specially designed to allow the maximum mixing effect of the static mixer. We recommend their use for applications that have large fluid flow ratios.

PAT.2045307

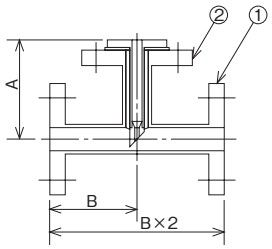



This type has an automatic On/Off switch at the tip of the injection tee's inlet nozzle.
This prevents the main fluid from flowing to the inlet side when the infusion is stopped.

PAT.2045307

### Dimensions

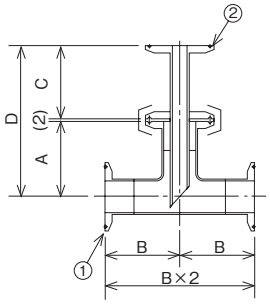
**● Standard Type**




| Model | Nominal Diameter (ND) ① | Amm | Bmm |
|---|---|---|---|
| T-□/15-3 | ½" | 90 | 80 |
| T-□/20-3 | ¾" | 90 | 80 |
| T-□/25-3 | 1" | 110 | 100 |
| T-□/40-3 | 1½" | 110 | 100 |
| T-□/50-3 | 2" | 140 | 115 |
| T-□/65-3 | 2½" | 150 | 120 |
| T-□/80-3 | 3" | 150 | 120 |
| T-□/100-3 | 4" | 160 | 150 |
| T-□/125-3 | 5" | 180 | 170 |
| T-□/150-3 | 6" | 190 | 180 |
| T-□/200-3 | 8" | 240 | 230 |

Size of flange ② is decided by the conditions of the flow.

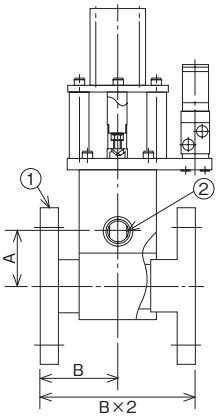
**● Sanitary Type**




| Model | Nominal Diameter (ND) ① | Amm | Bmm | Cmm | Dmm |
|---|---|---|---|---|---|
| T-□/25-3/S | 1S | 55 | 55 | 53 | 110 |
| T-□/40-3/S | 1½S | 70 | 70 | 53 | 125 |
| T-□/50-3/S | 2S | 82 | 82 | 56 | 140 |
| T-□/65-3/S | 2½S | 105 | 105 | 58 | 165 |
| T-□/80-3/S | 3S | 110 | 110 | 58 | 170 |

Size of flange ② is decided by the conditions of the flow.Joint can be changed to IDF Screw & Nut

**● Auto On/Off Type**




| Model | Nominal Diameter (ND) ① | Amm | Bmm |
|---|---|---|---|
| TA-□/ 25-3 | 1" | 40 | 60 |
| TA-□/ 40-3 | 1½" | 50 | 75 |
| TA-□/ 50-3 | 2" | 100 | 100 |
| TA-□/ 65-3 | 2½" | 100 | 150 |
| TA-□/ 80-3 | 3" | 100 | 150 |
| TA-□/100-3 | 4" | 135 | 150 |
| TA-□/125-3 | 5" | 145 | 150 |
| TA-□/150-3 | 6" | 170 | 150 |
| TA-□/200-3 | 8" | 195 | 150 |
| TA-□/250-3 | 10" | 205 | 150 |
| TA-□/300-3 | 12" | 260 | 150 |
| TA-□/350-3 | 14" | 280 | 150 |

Size of flange ② is decided by the conditions of the flow.Joint can be changed to ferrule type.

# Static Mixer selection sheet

| | |
|---|---|
| Company's name | |
| Department / Name | |
| Address | |
| TEL/FAX | |
| Quantity | unit |

For contact, please fill out the following and fax it to us or a dealer.

Static Mixer selection sheet
We design static mixers to suit your needs.
Please complete necessary information and fax this sheet to us.
In addition, we accept designs by email. Please see our website for details.

**FAX No.052-561-7149**

**http://www.noritake.co.jp/eeg/kakouki/index.html**

1mPa·s=1cP
1kPa=0.0102kg/cm²
1MPa=10.2kg/cm²

## 1. Purpose of mixing

☐Compounding ☐ Dilution ☐ Neutralization ☐Variance ☐ Extraction ☐ Emulsification
☐ Gas absorption ☐ Hot water production ☐ Liquid heating ☐ Temperature reduction
☐ Others ( ) ☐ Mutual solubility of two liquids ( ☐ Good ☐ Bad )

## 2. Design condition

| | Liquid A + Liquid B = Liquid C | | |
|---|---|---|---|
| Liquid name | | | |
| Flow rate | ☐m³/h ☐kg/h | ☐m³/h ☐kg/h | ☐m³/h ☐kg/h |
| Density | g/cm³ | g/cm³ | g/cm³ |
| Viscosity | mPa·s(cP) | mPa·s(cP) | mPa·s(cP) |
| Temperature | ℃ | ℃ | ℃ |
| Pressure | ☐MPaG (☐kg/cm²G) | ☐MPaG (☐kg/cm²G) | ☐MPaG (☐kg/cm²G) |

Design pressure ☐MPaG (☐kg/cm² G)
Design temperature ℃
Allowable pressure loss ☐kPa (☐kg/cm² )

In the case of steam heating
☐ One-pass temperature increase
☐ Recycling temperature increase
In the case of recycling temperature upnternal volume of the total route ___ m³
Heating-up time _____ min

## 3. Specification

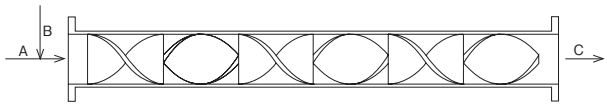
※We will choose the flange size, housing size and number of schedules and elements.
Only fill in the following if you have special specifications.

(1) Flanges
Size : _____"
Standard : ☐ JIS 10K-FF ☐ ANSI150LB ☐ Other ( )
Materials : ☐ 304S.S ☐ 316S.S ☐ Otherr ( )

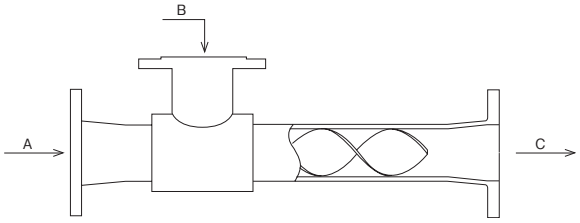
(2) Housing
Size: _____"
Housing schedule : ☐ Sch40 ☐ Other ( )
Materials : ☐ 304S.S ☐ 316S.S ☐ Other ( )

(3) Elements
Materials : ☐ 304S.S ☐ 316S.S ☐ Other ( )

### ● Normal type

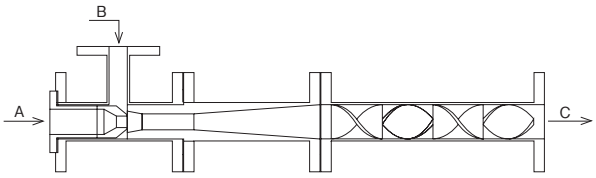



### ● Steam heating type




※Please specify saturated or superheating steam.
Noritake cooker is chosen for high viscosity liquids and slurry.

### ● Absorption type



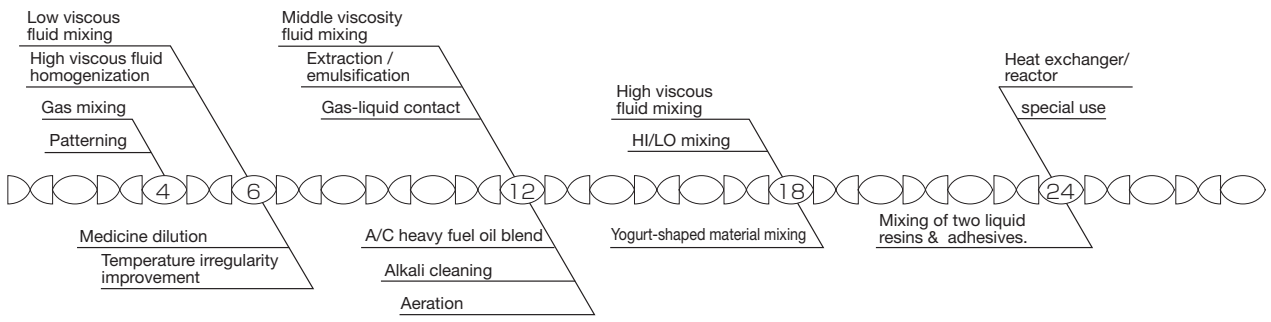

## 4. Application standard

☐ JIS ☐ ANSI ☐ JPI ☐ Others

## 5. Application lawn standard

☐ Gas Business act ☐ High-pressure Gas Safety Law ☐ Pressure Vessel ☐ Fire Service Law
☐ Electricity Business Act ☐ Other ( )

## ■Number of elements application example



# SM heat exchanger selection sheet

SM heat exchanger selection sheet
We design SM heat exchangers suit your applications.
Please complete necessary information and fax this sheet to us.
In addition, we accept designs by email. Please see our website for details

**FAX No.052-561-7149**

**http://www.noritake.co.jp/eeg/kakouki/index.html**

| | |
|---|---|
| Company's name | |
| Department / Name | |
| Address | |
| TEL/FAX | |
| Quantity | unit |

For contact, please fill out the following and fax it to us or a dealer.

## 1. Purpose of the heat exchange : ☐ Heating ☐ Cooling

☐ One-pass temperature increase
☐ Recycling temperature increase In the case of recycling temperature up
Internal volume of the total route

1kg/cm2=98kPa
1P=1×10-1Pa·s
1kcal/h=4.19kJ/h=1.16W
1kcal/m2·h·℃ =1.16 W /m2·K
1m 2·h·℃ /kcal=0.86m2·K/W
1kcal/m·h·℃ =1.16 W/m·K

## 2. Design conditions

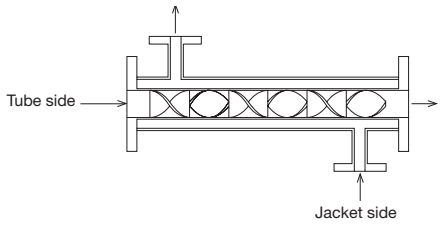
| | | ☐SI unit | (☐MKS unit) | Jacket side | Tube side |
|---|---|---|---|---|---|
| Liquid name | | – | – | * | * |
| Flow rate | W | kg/h | kg/h | | * |
| Density | ρ | kg/m³ | kg/m³ | * | * |
| Viscosity | μ | Pa·s | P | * | * |
| Specific heat | Cp | kJ/kg·K | kcal/kg·℃ | * | * |
| Thermal conductivity | λ | W/m·K | kcal/m·h·℃ | * | * |
| Fouling resistance | γ | m2·K/W | m²·h·℃/kcal | | |
| Thermal conductivity of the heat exchanger tube | κ | W/m·k | kcal/m·h·℃ | ——— | |
| Pipe diameter | Inner Diameter | m | m | | |
| | Outside Diameter | m | m | ——— | |
| Temperature | Entrance | ℃ | ℃ | * | * |
| | Exit | ℃ | ℃ | | * |
| Exchange heating value | Q | kJ/h | kcal/h | | |

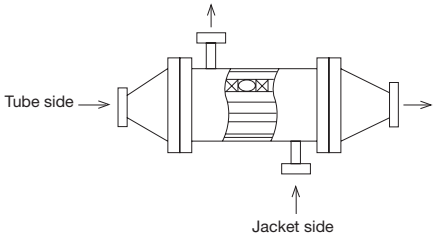
| | |
|---|---|
| Design pressure ( Jacket side ) | ☐MPaG (☐kg/cm² G) |
| Design pressure (Tube side) | ☐MPaG (☐kg/cm² G) |
| Design temperature ( Jacket side ) | ℃ |
| Design temperature (Tube side) | ℃ |
| Allowable pressure loss | ☐kPa (☐kg/cm² ) |

＊Must be filled out to choose correct heat exchanger.

## 3. Specification

(1) Type ☐ Double tube type ☐ Multi tubular




(2) Element Fixing
☐ Removable ☐ Both ends weld ☐ Edge seal

(3) Materials
Wetted part ☐ 304S.S ☐ 316S.S ☐ Others ( )
Jacket part ☐ 304S.S ☐ 316S.S ☐ Others ( )

(4)Finish
☐ No polishing ☐ Polishing

(5) Flow
☐ Counter flow ☐ Parallel flow

Please use this space to add comments about specifications.

## 4. Application standard

☐ JIS ☐ ANSI ☐ JPI ☐ Others ( )

## 5. Application law

☐ High-pressure Gas Safety Law ☐ Pressure Vessel
☐ Others ( )

# Pressure drop reckoner

## ■ Pressure drop calculation

From Fanning formula　△P=4f(ρu2/2gc)(L/D) ……(1)

Pressure loss of straight pipe and isometric static mixers is found by revising formula (1) like formula (2).

△P=4fsm(ρu2/2gc)(L/D) ……(2)

Formula (2) becomes formula (3) so that it is expressed as L/D=1.5E.

△P=4fsm(ρu2/2gc)(1.5E)

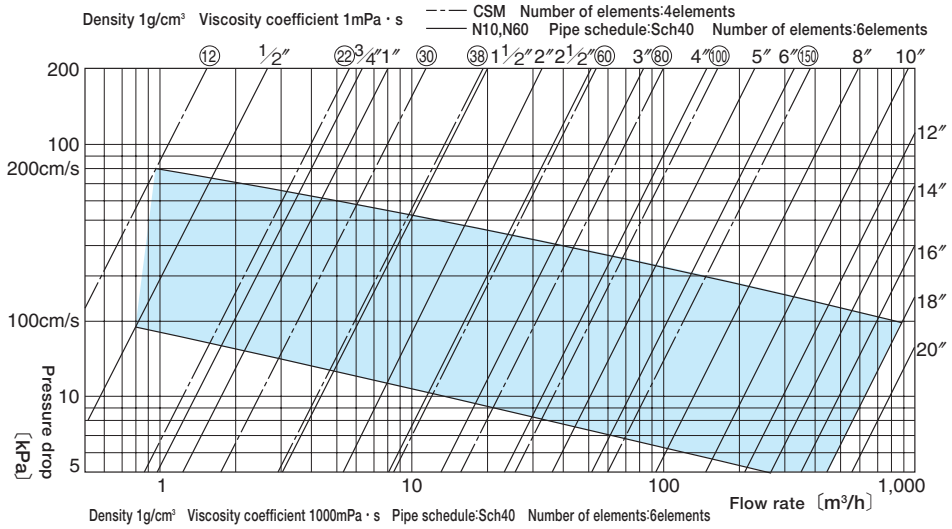
=3.0×10-3fsmρu2E ……(3)

About fsm value, there is technical report separately.

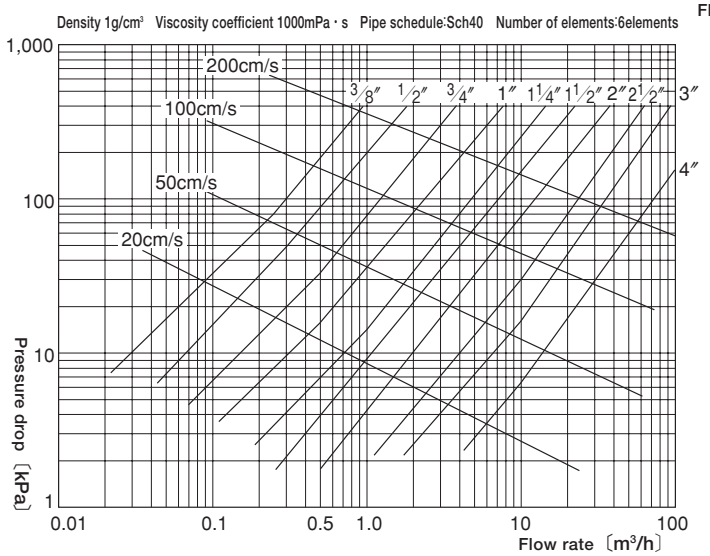
1kg/cm²=98kPa

△P : Pressure drop [ g/cm² ]
f : Friction coefficient of pipe [-]
ρ : Fluid density [g/cm³ ]
u : Flow velocity [cm/s]
gc : Gravitational conversion factor
L : Pipe length [cm]
D : Pipe diameter [cm]
fsm : Friction coefficient of the static mixer
E : Number of elements

## ■ Pressure drop examples



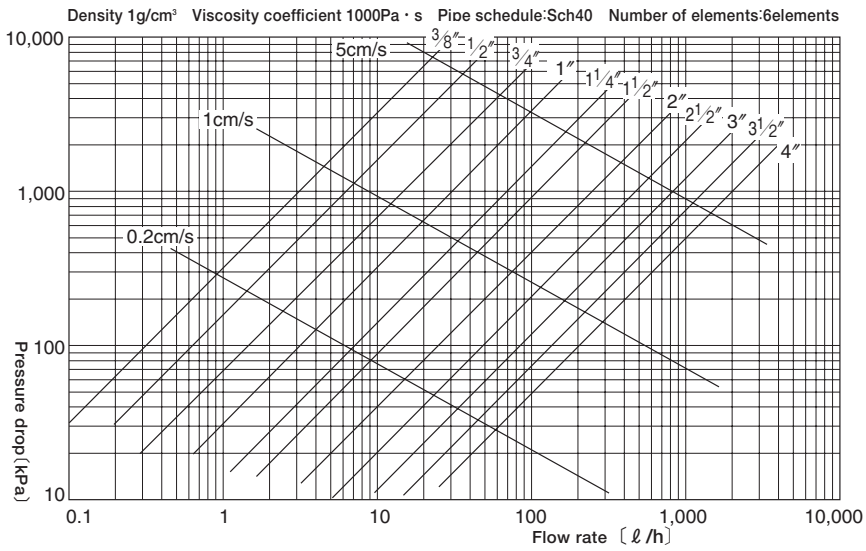

part is an economic basin of pressure drop and flow rate.
Please refer to it for configuration.




When at around 1000MPa.s and viscosity doubles, pressure drop also doubles.

Example：From a graph where Viscosity = 2000mPa.s、Flow rate = 0.5m³ and diameter = 1", When viscosity = 1000mPa.s pressure loss is about 16kPa.
Therefore,

$$16\text{kPa} \times \frac{2000\text{mPa·s}}{1000\text{mPa·s}} \fallingdotseq 32\text{kPa}$$



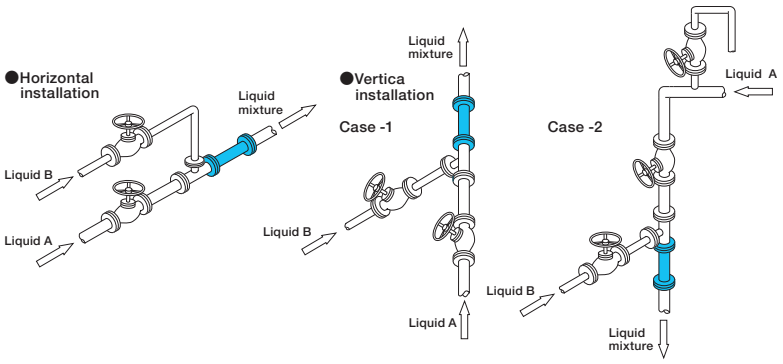

In the case of high viscosity fluid (Re Number less than 10), when a multiple is applied to the viscosity, the same amount is applied to pressure loss.
Example: From a graph where Viscosity = 100Pa.s, Flow rate = 100l/h and diameter 1 ½. When viscosity is 1000 Pa.s = pressure loss is 900kpa
Therefore,

$$900\text{kPa} \times \frac{100\text{Pa·s}}{1000\text{Pa·s}} \fallingdotseq 90\text{kPa}$$

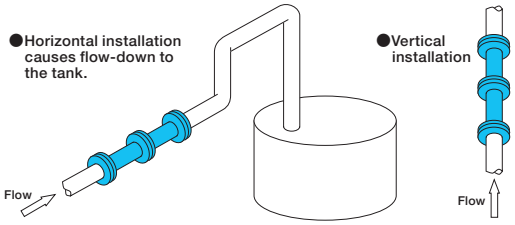
# Static Mixer Installation

*The following are examples of installed systems.
Your system will function well, as long as you make sure that there is no air in the system, and that the fluid level is full.
We also recommend that you install a valve or a non-return valve at each fluid inlet, an air bleeder valve at the top of each piping and a drain valve at the bottom.

## 1. N10, N16, N33, N30, N40, N50, N60, CSM, WSM series

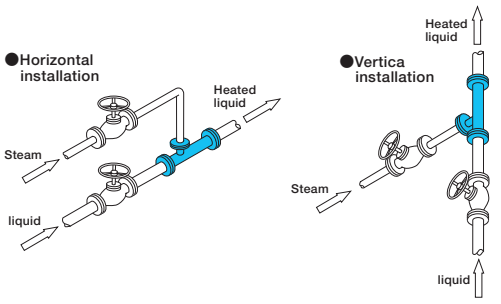



## 2. FSN, N26, series (In the case of pulp liquid)

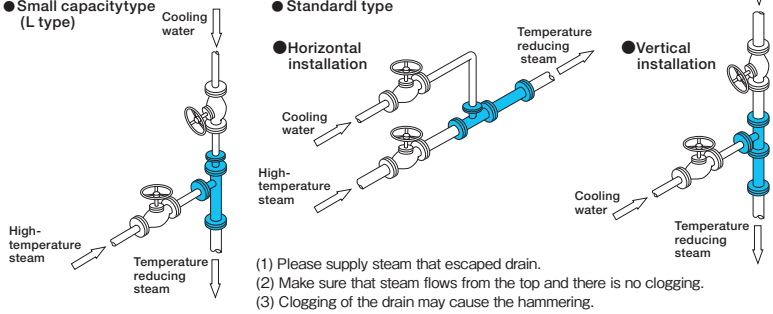



Plug-up can occur if liquid is not full.

## 3. SME, NST series

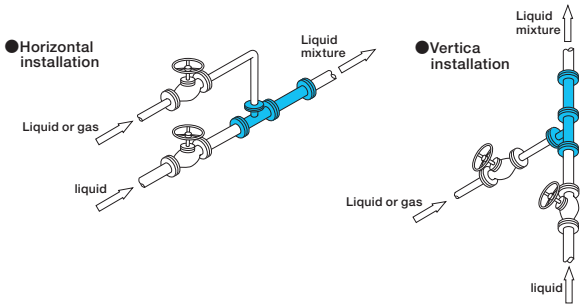



## 4. DMS series

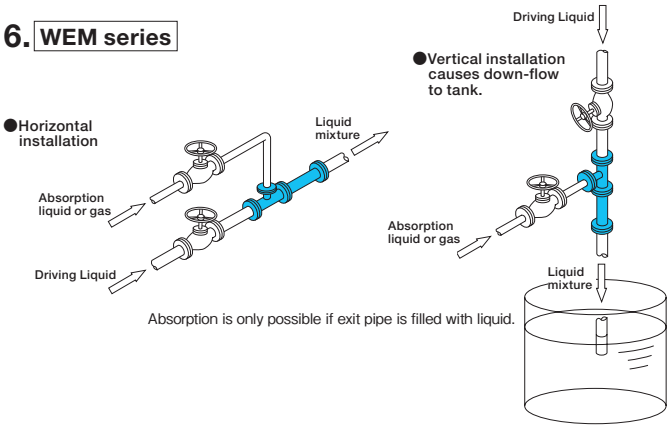



(1) Please supply steam that escaped drain.
(2) Make sure that steam flows from the top and there is no clogging.
(3) Clogging of the drain may cause the hammering.

## 5. SMD series



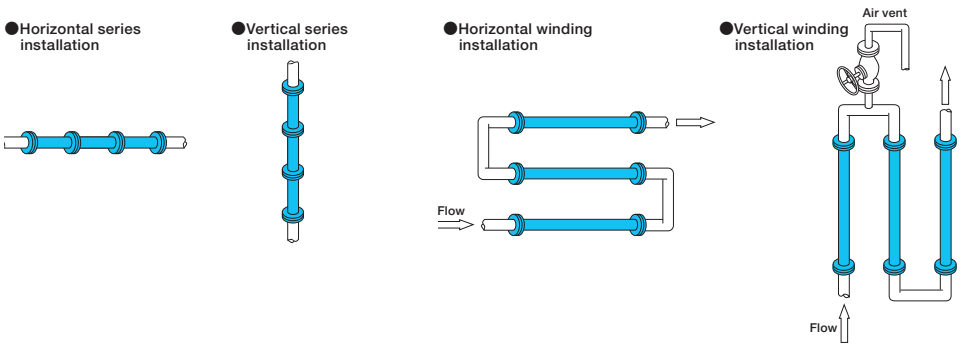

## 6. WEM series




Absorption is only possible if exit pipe is filled with liquid.

## 7. Module Connection Method

Set the element straight onto the joining surface.



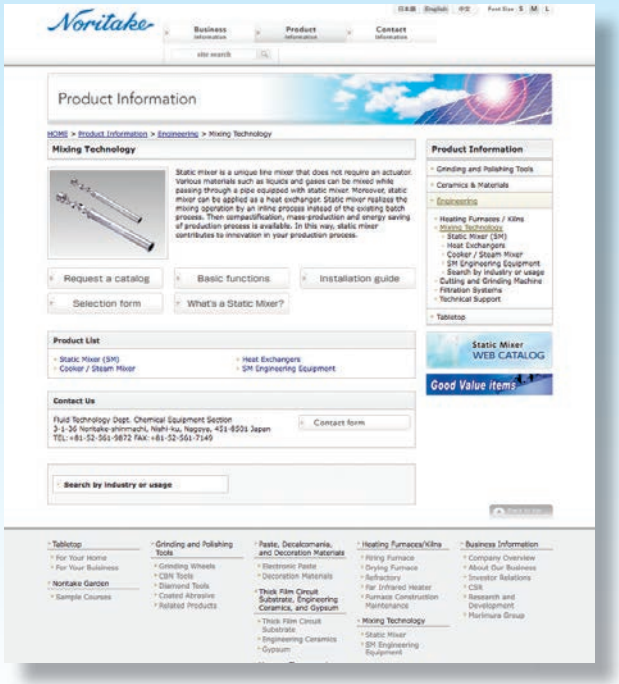
# Introduction of our website

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

**http://www.noritake.co.jp/eng/products/eeg/mixing/index.html**

## 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
Before Purchasing

- To make certain you choose the right products for your needs, please consult with Noritake or a qualified agent.
- 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 figured.
- 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.