NISSHIN ENGINEERING
Powder Processing Equipment - General Catalog

Powder Technology & Project Engineering

Nisshin Engineering provides solutions for global needs through powder technology
Nisshin Engineering is a leader in developing powder technology and project engineering applied equipments.

All equipments that Nisshin Engineering is proud to present to the world, including the first classifier in the world that can classify submicron particles, pulverizers, mixers, feeders and pneumatic conveyors have functions and structures reflected to satisfy the needs of customers based on the history and achievement of the powder processing technologies of Nisshin Seifun Group.

As a leading company in powder processing, Nisshin Engineering provides high quality and high precision powder instruments to the society and to the world by utilizing advanced technologies and state-of-the-art facilities.
Turbo Classifier has achieved sub micron level classification for the first time in the world. High quality classification requiring various powders can be accurately and efficiently classified for wide range of cut point (0.5-100μm).

The powder supplied to the material inlet is sucked into the classifier, uniformly dispersed by the dispersion blade and dispersion disc, and fed into the classification zone. Each particle receives centrifugal force generated by the rotor and drag force generated by air flowing toward the center direction. Coarse particles shift to the outside by centrifugal force, fine particles shift to the center side by drag force.

**Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Cut point (μm)</th>
<th>Rotor speed (rpm)</th>
<th>Air flow rate (m³/min)</th>
<th>Fine output (kg/h)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC-100</td>
<td>1-50</td>
<td>4000</td>
<td>600</td>
<td>30-0</td>
<td>150</td>
</tr>
<tr>
<td>TC-15NS</td>
<td>1-50</td>
<td>4000</td>
<td>600</td>
<td>30-0</td>
<td>150</td>
</tr>
</tbody>
</table>

* The special specifications such as anti-abrasive, anti-adhesive and inert gas circulation are also available.

**Structural cross section**

![Turbo Classifier Cross Section](image)

**AERO FINE CLASSIFIER**

Strong centrifugal force produced by high speed vortex promotes highly accurate classification from sub-micron to single micron particles.

- The twin air system achieves highly accurate classification.
- The secondary air system is added to the main air system.
- The secondary air at the upper zone stimulates dispersion of the material powder sending them to the classification field in a sub-micron cut point.
- The secondary air at the lower zone stimulates recirculation mechanism.

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<tr>
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<tbody>
<tr>
<td>AC-10</td>
<td>0.3-10</td>
<td>4000</td>
<td>600</td>
<td>30-0</td>
<td>150</td>
</tr>
<tr>
<td>AC-20</td>
<td>0.3-10</td>
<td>4000</td>
<td>600</td>
<td>30-0</td>
<td>150</td>
</tr>
<tr>
<td>AC-30</td>
<td>0.3-10</td>
<td>4000</td>
<td>600</td>
<td>30-0</td>
<td>150</td>
</tr>
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**Structural cross section**

![Aero Fine Classifier Cross Section](image)
**POWDER MIXER Hi-X Series**

The Hi-X series achieves high precision and high speed mixing. This powerful mixer answers various and difficult requirements for powder mixing applications.

Sphere mixing chamber eliminates powder stagnating dead space.

Heat generation and pulverization level can be controlled by changing the tilt angle of the mixing chamber.

Scraper removes powder adhered to the chamber wall. Mixed powder can be easily discharged by only turning the scraper.

The mixing time can be automatically set by the timer.

The safety device is installed. The equipment is easy to disassemble and clean.

* The jacket structure enables heating or cooling of the powder while mixing.

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**SUPER JET MILL**

The Super Jet Mill achieved very narrow particle size distribution. Simple structure inhibits contamination and enables pulverization into single micron size without heat generation.

- **Specifications**
  - **Models**
    - SJ-100GM
    - SJ-100K
  - **Dimensions (mm)**
    - SJ-100GM: 370×370×390
  - **Weight (kg)**
    - SJ-100GM: 45
  - **Compressor Pressure (kPa)**
    - SJ-100GM: 140
  - **Ejector Pressure (kPa)**
    - SJ-100GM: 140
  - **Fine Powders**
    - SJ-100GM: 0.5–0.7

"Super Jet Mill" pulverizes powders only by compressed air with no moving parts. Fine powders are produced by mutual collision and friction with the wall using the high speed compressed air injected from the multiple nozzles arranged on the circumference. The regulated air flow prepared through analysis of cyclone air turbulence inside the machine produces particles having narrow particle size distribution with only a limited amount of coarse powder mingled.

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**JET MILL - SJ Series**

Contamination-free pulverization is possible because particles are pulverized by the particles' mutual collision and friction with the wall with no moving parts.

Produces "No" heat because it is an adiabatic expansion system. Suited for heat sensitive powders.

Simple structure enables easy disassembly and cleaning. Suited for manufacturing of many varieties, small amount and pharmaceutical products.

The unique wall structure increases classification to prevent coarse particles to shift to the centering direction. Powder with very narrow ranged size distribution can be obtained.

Cyclone structure can be added to the main body of the pulverizer. It can greatly simplify the whole system.

The ceramics specification enables anti-abrasive and contamination-free operation. (Standard ceramic specifications: SiAlON) Ceramic material such as ZrO2, Al2O3, SiC, etc. can be selected.

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**Experimental result for mixing Corn starch with SiC**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Particle diameter (μm)</th>
<th>Particle density (g/cm³)</th>
<th>Mixing ratio (%)</th>
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</thead>
<tbody>
<tr>
<td>Corn starch</td>
<td>17.5</td>
<td>1.450</td>
<td>80</td>
</tr>
<tr>
<td>SiC particle size 18.0</td>
<td>18.0</td>
<td>3.200</td>
<td>29</td>
</tr>
</tbody>
</table>

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**MIXER HI-X**

The Hi-X, achieves high precision and high speed mixing. This powerful mixer answers various and difficult requirements for powder mixing application.

* The jacket structure enables heating or cooling of the powder while mixing.

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**Structural cross section**

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**Specifications**

- **Models**
  - Hi-X1000
  - Hi-X1800
  - Hi-X3000
  - Hi-X5000
  - Hi-X7000
- **Net capacity (kg)**
  - 1.7
  - 9.9
  - 28.2
  - 100
- **Power (kW)**
  - Impeller: 0.75
  - Scraper: 0.59
- **Nozzle size (mm)**
  - 200–600
  - 30
- **Tilting range (°)**
  - 130
  - 500
  - 700
  - 200

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Super Rotor is an optimal solution for pulverizing materials such as resin into fine particles. Blade Mill can pulverize elastic and/or fiber materials efficiently. The powerful vortex generated in the narrow gap between the fixed liner and the rotor (blade) materializes highly efficient powder pulverization. Super Rotor is equipped with a unique pulverizing rotor, which enables long-term stable and low-cost operation. Fine powder pulverization can be achieved without excessive pulverization. The pulverized particle distribution is very narrow.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>BM-25</th>
<th>BM-25 / SR-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed width</td>
<td>400~450</td>
<td>600~750</td>
</tr>
<tr>
<td>Diameter of liner</td>
<td>450~500</td>
<td>750~900</td>
</tr>
<tr>
<td>Weight</td>
<td>165</td>
<td>300</td>
</tr>
<tr>
<td>Rotor speed</td>
<td>~4000</td>
<td>~5000</td>
</tr>
<tr>
<td>Air flow rate</td>
<td>0.5~3</td>
<td>8~10</td>
</tr>
<tr>
<td>Motor</td>
<td>3.7~5.5</td>
<td>11~18.5</td>
</tr>
</tbody>
</table>

Feedcon-μ can accurately feed small amount of powder constantly and quantitatively. It meets variety of needs for experimental and industrial uses.

Feedcon-μ (Type M)

It is a manual type feeder that is capable of supplying minute quantity of powders from ordinary powders to fine powders having strong adhesive and cohesive characteristics. A unique screw feed mechanism materializes stable powder supply without fluctuation due to changes of powder surface level or pulsatory feed due to screw rotation.

Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>Feed rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCPm-03F</td>
<td>300~600</td>
</tr>
<tr>
<td>FCPm-200F</td>
<td>500~800</td>
</tr>
</tbody>
</table>

Feedcon-μ (Type N)

Feeder Type: Alotter Type

Stable feed-back control of feed rate is done by continuously monitoring the actual weight of feeder by a precision balance. The feeder is operated by a full automatic operation required only by entering the numerical input of the set feed rate. The allotter type for batch feeding or the feeder type for continuous and stable powder supply can be selected.
The RF plasma, which the center temperature exceeds 10,000˚C, enables particle production with high purity (high crystalline) properties and high dispersibility.

The surface modification, surface oxidation and alloy formation suppress rapid oxidation of metal nanometer size particles.

By controlling the temperature passing through the plasma, spheroidized particles is available.

By supplying multiple materials to the plasma, composite material can be produced.

By controlling the atmosphere and other environmental conditions, oxides, carbides and nitrides can be produced.

Metal, ceramic and other particles of several tens of nanometers size can be produced by evaporation and condensation.

By controlling the temperature passing through the plasma, spheroidized particles is available.

Available process

- Pulverization
  - Jet mill: Pulverizes powders only by compressed air with no moving parts. Fine powders are produced by mutual collision and friction with the wall using high speed compressed air injected from the multiple nozzles.
  - Mechanical pulverizer: Powder particles sucked into the high speed vortex generated by the unique grooved rotor are pulverized by shearing force. Powder particles are impacted, sheared, scraped and pulverized between the pins set on both sides of the high speed rotating disk.

- Classification
  - Air classification: The rotor type Turbo Classifier is widely applicable. The semi-vortex air flow type Aero Fine Classifier is applicable to powder with light specific gravity and sub micron powders. EDTy Classifier used exclusively for coarse powder (sieve applicable range) can process large amount of powders. They are all applicable from experimental scale to mass production reaching several hundreds tons.
  - Sieving: Classification around hundred microns is available.

- Characteristics measurement
  - Measurement items: Laser diffraction method [Microtrac/MT3300EX, HRA, FRA (wet)], MasterSizer2000(dry/wet), electrical resistance method [Couler counter Multizer(B)wet]]. Flow type Particle Image Analyzer [FPIA-3000], sieving method, microscopic method, specific surface area method
  - Powder characteristics: Powder tester.
  - Component analysis: Moisture measurement.
  - Photograph: Scanning electron microscope (SEM), optical microscope, stereoscopic microscope.