



NISSHIN ENGINEERING

AIR CLASSIFIER

TURBO CLASSIFIER



**It achieves classification of sub micron level
for the first time in the world.
Accurate and efficient classification,
meeting variety of requirements.**

NISSHIN SEIFUN GROUP

NISSHIN ENGINEERING INC.

Turbo Classifier achieves highly precise, highly efficient classification.
Excellent performance that achieved the sub micron level classification
of powder for the first time in the world.

Turbo Classifier realizes high-precision classification of particles, controlling characteristics of new materials including fine ceramic, polymer, complex material and electronics material, according to the purpose of their use. The epoch-making classification system achieves the minimum classification diameter of as small as 0.5 μ m, utilizing movement of particles, which realizes ultra fine diameter of the particles to be classified, minimal distribution range of the particle size, full control of top size or bottom size of the particle diameter, high purification of the main ingredient and selected separation of the particle shape.

It will appeal the excellent functions in every industrial field including particle size adjustment required in the most advanced industry covering plastic, metal, ceramics and food.

Features of Turbo Classifier

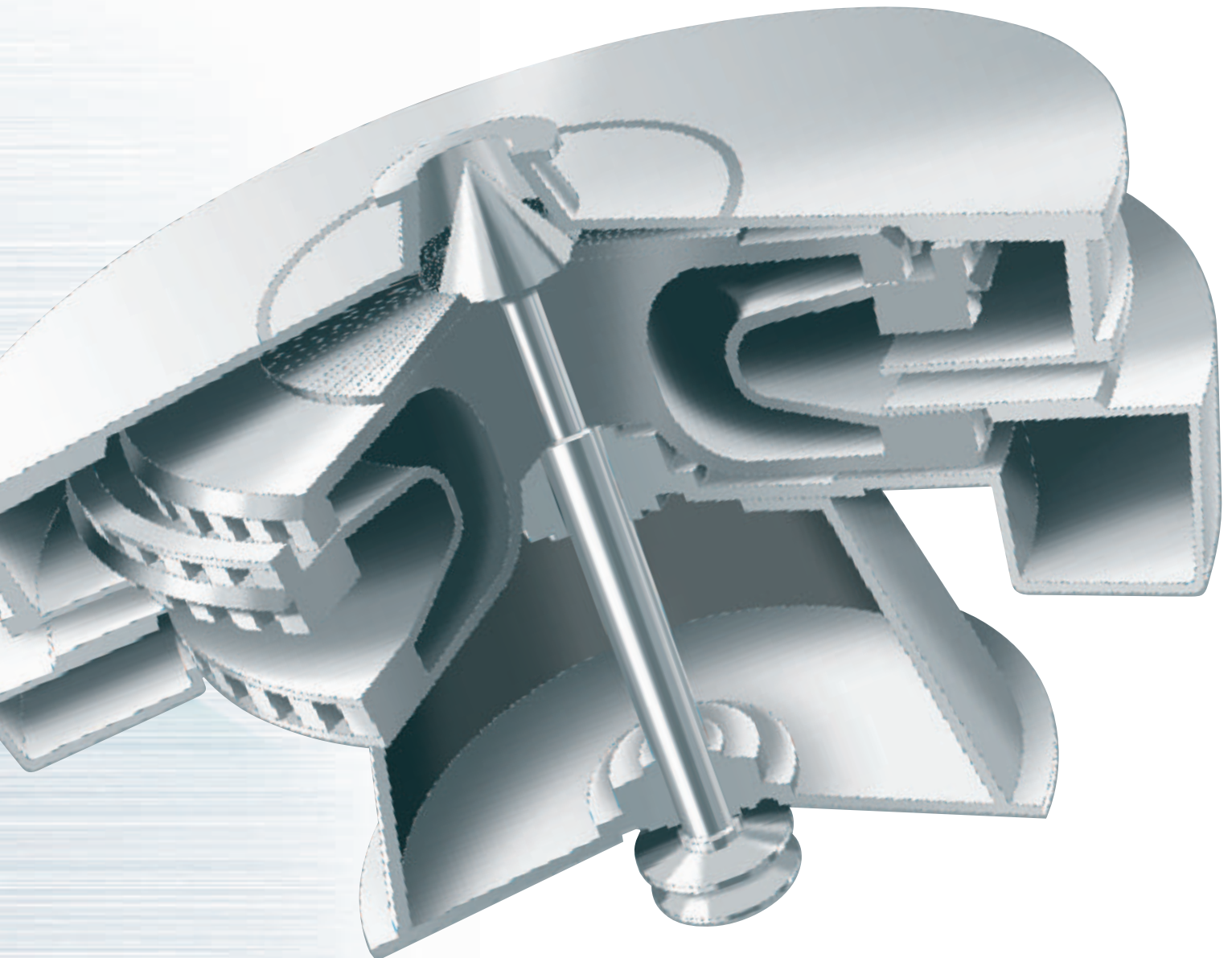
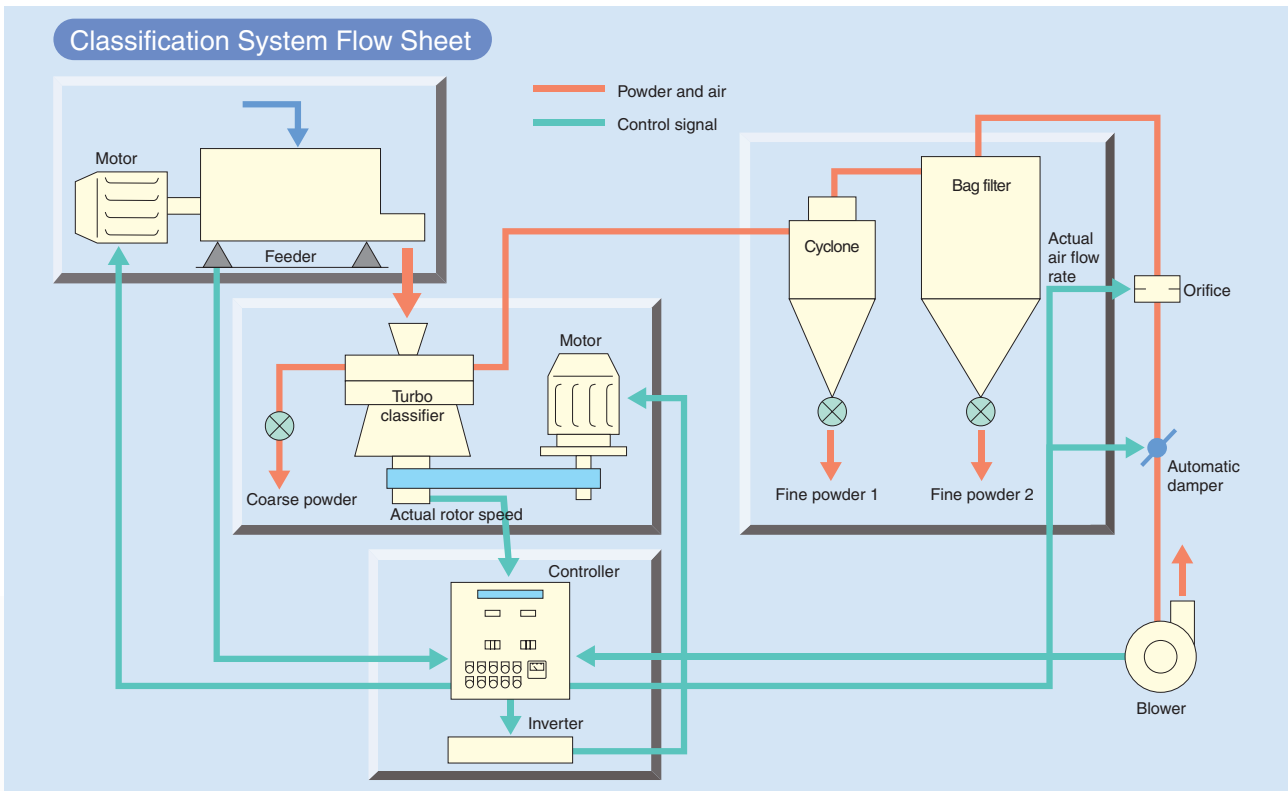
Functional operation

High precision classification performance

Easy operation

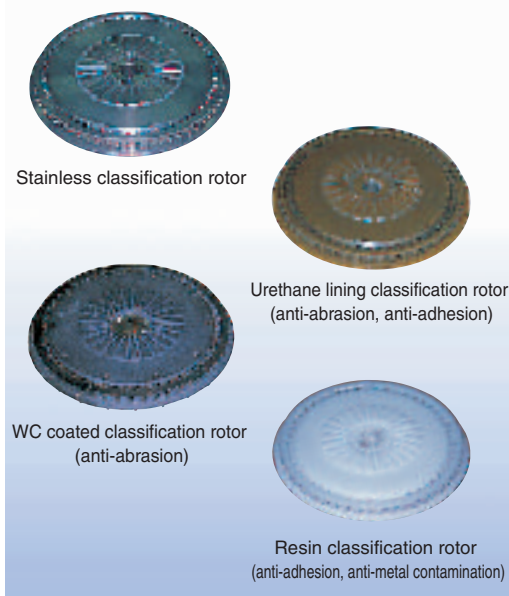
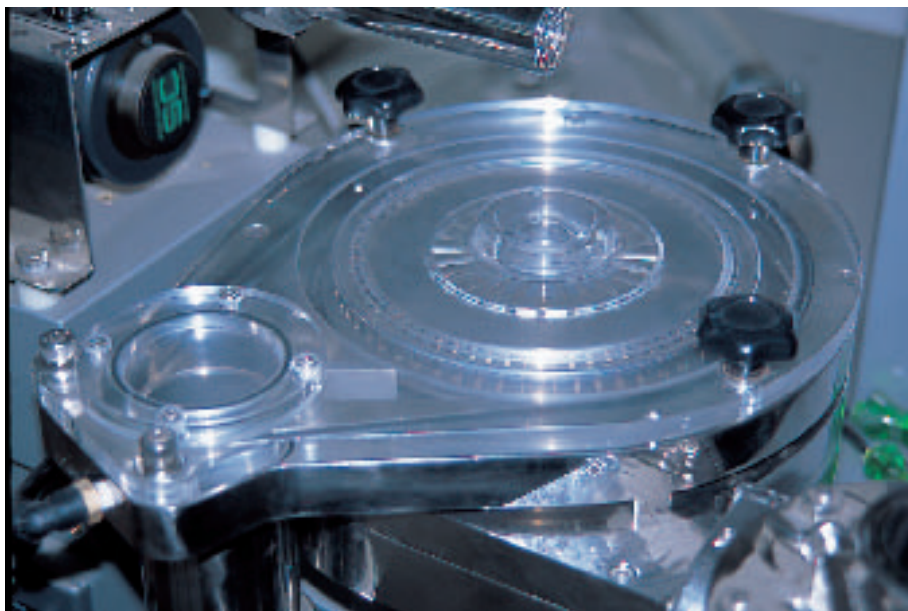
Mass processing capacity

**TURBO
CLASSIFIER**



Always aiming at advanced system.

Our original precision performance classification system was made based on the development thought prioritizing the easiness of use, answering the needs of users.

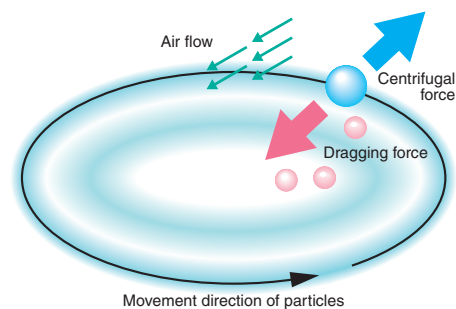
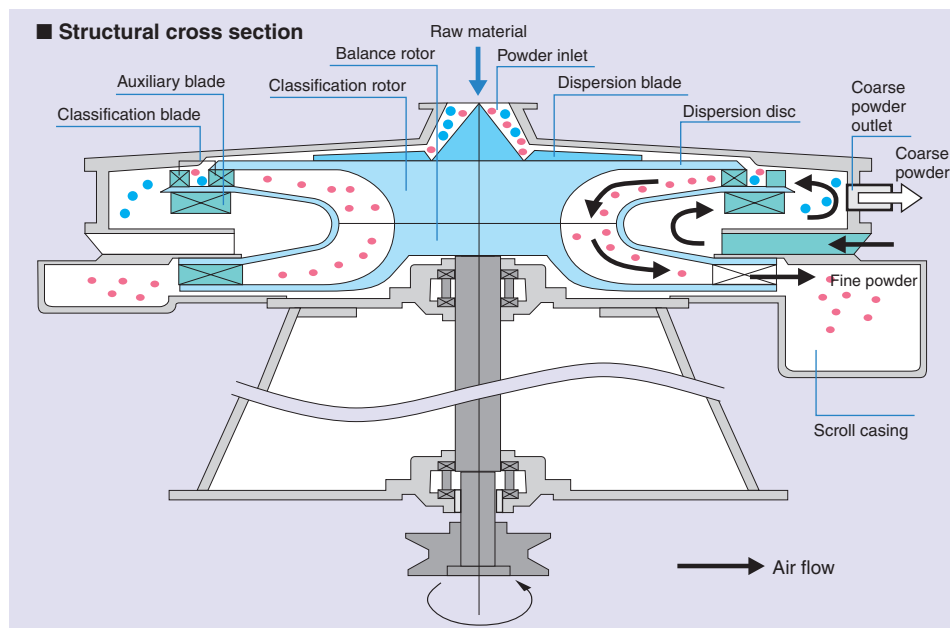


Turbo Classifier is the product which was originally developed by Nisshin Flour Milling Co., Ltd. for its own powder processing job and had been so used for over 20 years. Then it was marketed based on the actual results of use. Therefore, unlike other products manufactured by machine makers, it has a lot of epoch-making classification functions which reflect the requirements of users to its functions and structure to be used.

Structure and mechanism of Turbo Classifier

The powder fed through the raw material inlet becomes airborne in the unit, being evenly distributed by the dispersion blade and dispersion disc, and is sent to the classification zone. There, each particle of the powder receives centrifugal force caused by the revolution stream and dragging force caused by the air flow in the radius direction, where the coarse particles are affected by the centrifugal force and the fine particles are affected by the dragging force and each of them is

moved on different orbits and so classified. The coarse particles are blown out of the classification rotor by the centrifugal force and taken out of the coarse powder outlet with the state that is air-sealed. Meanwhile, the fine powder is carried into the rotor together with an air flow, then carried by the air flow rectified by the auxiliary blade through the classification rotor, the balance rotor and the scroll casing, then collected by the cyclone and bag filter.



Adjustment of classification point for Turbo Classifier

To adjust the classification point of Turbo Classifier, revolution speed of the classification rotor and flow rate of the passing air are adjusted. Since the variable range of the air flow is limited, it is usually maintained at certain level to be used for fine adjustment. Therefore, the number of revolution of the classification rotor is mainly used for the adjustment.

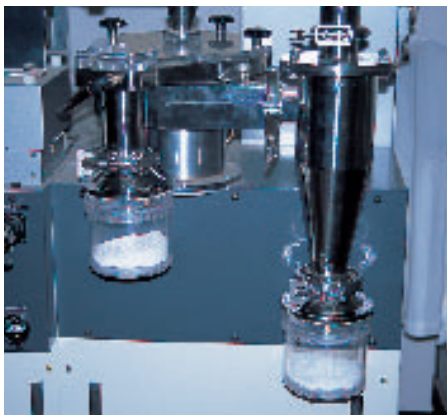
■Features of Turbo Classifier

Double dispersion mechanism that achieves highly precise classification

The important thing to enhance the accuracy of particle classification is to make the particles close to a single particle state when sending the powder into the classification zone. In this sense, Turbo Classifier can achieve the highly precise classification as follows. The primary dispersion mechanism of Turbo Classifier almost evenly disperses the powder which is inhaled together with air to the direction of the circumference, by means of the radial dispersion blades and grooves. Then, the secondary dispersion mechanism promotes the disintegration when the powder passes through a narrow gap between the flat dispersion disc which is revolving at high speed and the fixed casing, thus dispersing the powder into a single type of particles.

Fast coarse powder collection and fine powder re-collection mechanisms that substantially enhance processing capacity

Turbo Classifier has excellent fast performance to collect powder processed. Its mechanism quickly collects the coarse powder through the coarse powder outlet which is directly connected to the outer circumference, and the re-collection mechanism re-collects the fine powder which is mixed in



the coarse powder, by means of the air stream accelerated by the auxiliary blade of classification rotor and channel air. By these mechanism, its processing capacity is greatly enhanced under highly precise classification.

Air rectifying mechanism based on turbo theory to enhance accuracy and efficiency of classification

To enhance accuracy of the classification, it is necessary to keep the air stream in the classification zone even. Using the turbo fan theory, Turbo Classifier determines the optimal shape and dimensions for the classification rotor and classification blade to have an

even air flow. It is also equipped with a balance rotor to prevent the uneven stream in the radius direction and the local spiral flow caused by inhalation of the external blower, which also prevents the pressure loss by the classifier main body.

Revolution control method of classification rotor to provide easy operation

The classification point of the Turbo Classifier can easily be set by adjusting revolution speed of the classification rotor and air flow rate. Especially, setting of the classification point by only adjusting the revolution speed under the state of a constant air flow rate can momentarily provide easy operation for the various specifications of various particle sizes.

Compact design, improving work performance wherever it is installed

The technology which Nisshin Engineering is proud of successfully made the size of the classifier smaller without impairing the accuracy and functionality of Turbo Classifier. Since its height was made shorter, a free space was made above the powder inlet, which enables the unit to be installed at a place with limited space and smooth feeding to the unit.

Classifier-specific control system, providing full automatic operation

Turbo Classifier has employed specific controllers for its full series to maintain the classification point at a constant level under various conditions. That is - it always compares the setting values for the air flow rate and number of revolution, which are the variation factors of the classification point, with the actual measurement values and exe-

cutes feed-back control. In case of a full automatic laboratory machine, optimal classification conditions are selected and full automatic operation is provided by only inputting the classification point, true density and feed rate through the operation panel.

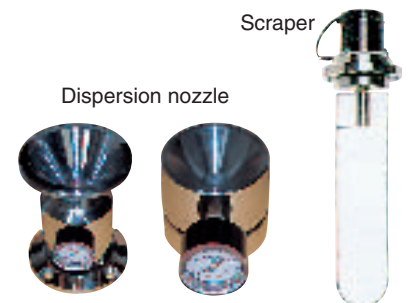
Special specifications, expanding usage of classifier

● **Anti-abrasion special specifications, anti-adhesion special specification**

To classify the powder with intensive abrasive characteristics, special specifications which applied ceramics or ultra hard material to the area susceptible to the wear is readily available. Or special specifications which used urethane rubber or plastic to prevent adhesion is also available.

● **Option for powder with strong cohesion and adhesion characteristics**

To treat the powder characterized by strong cohesion or adhesion, the dispersion nozzle to promote dispersion of the powder and the scraper to rub off the adhesive powder were added to the line-up.



● **Classification under special circumstance**

To classify the powder which intensely oxidizes, a classification system that can control oxygen content is available, which can execute highly accurate classification in the inert gas such as nitrogen.

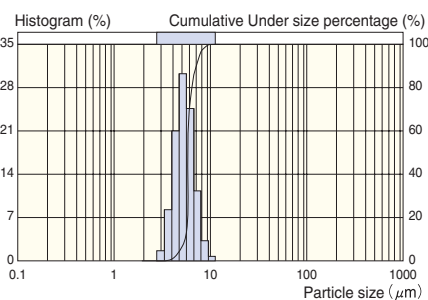
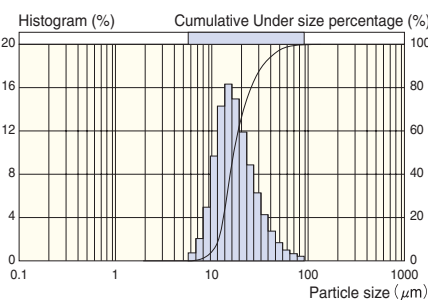
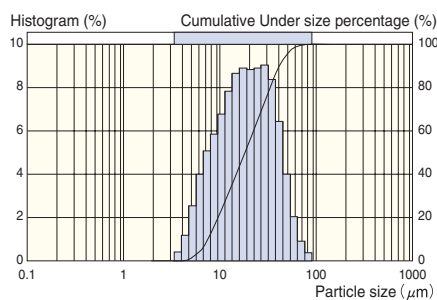


Turbo Classifier at use in a plant

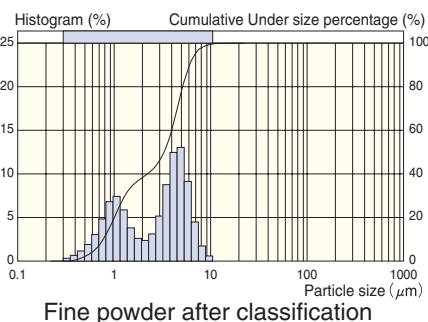
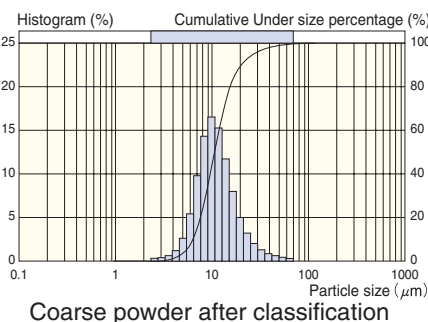
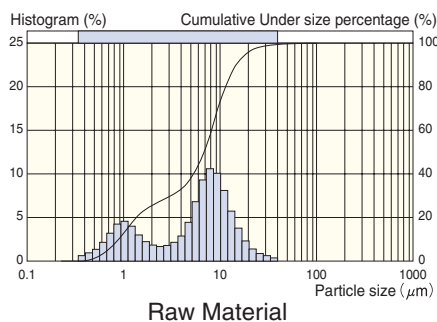
High accuracy, sub micron classification can meet the needs of users.

Examples of classification

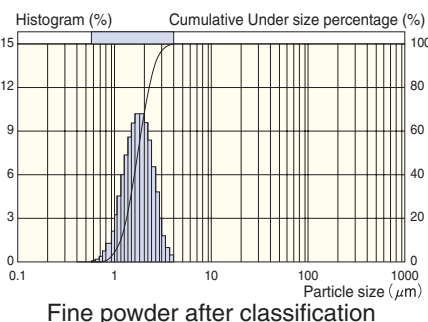
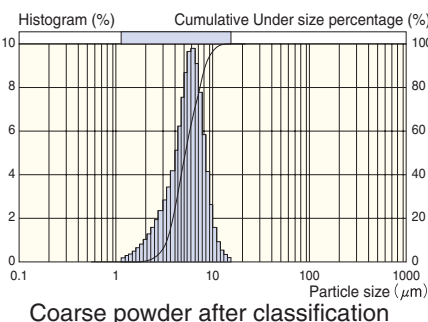
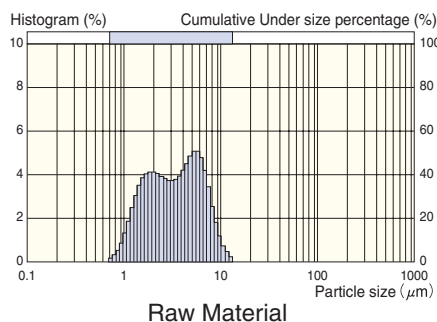
■ Metal powder (copper powder)



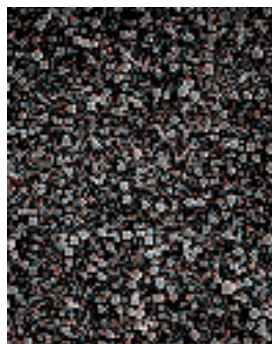
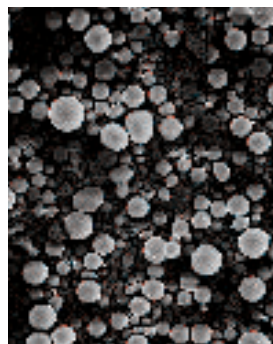
■ Battery raw material (metal oxide)



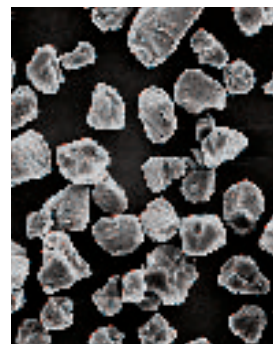
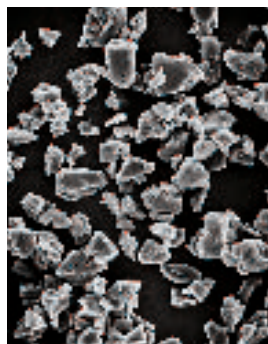
■ Mineral (Bakuhanseki:healstone)



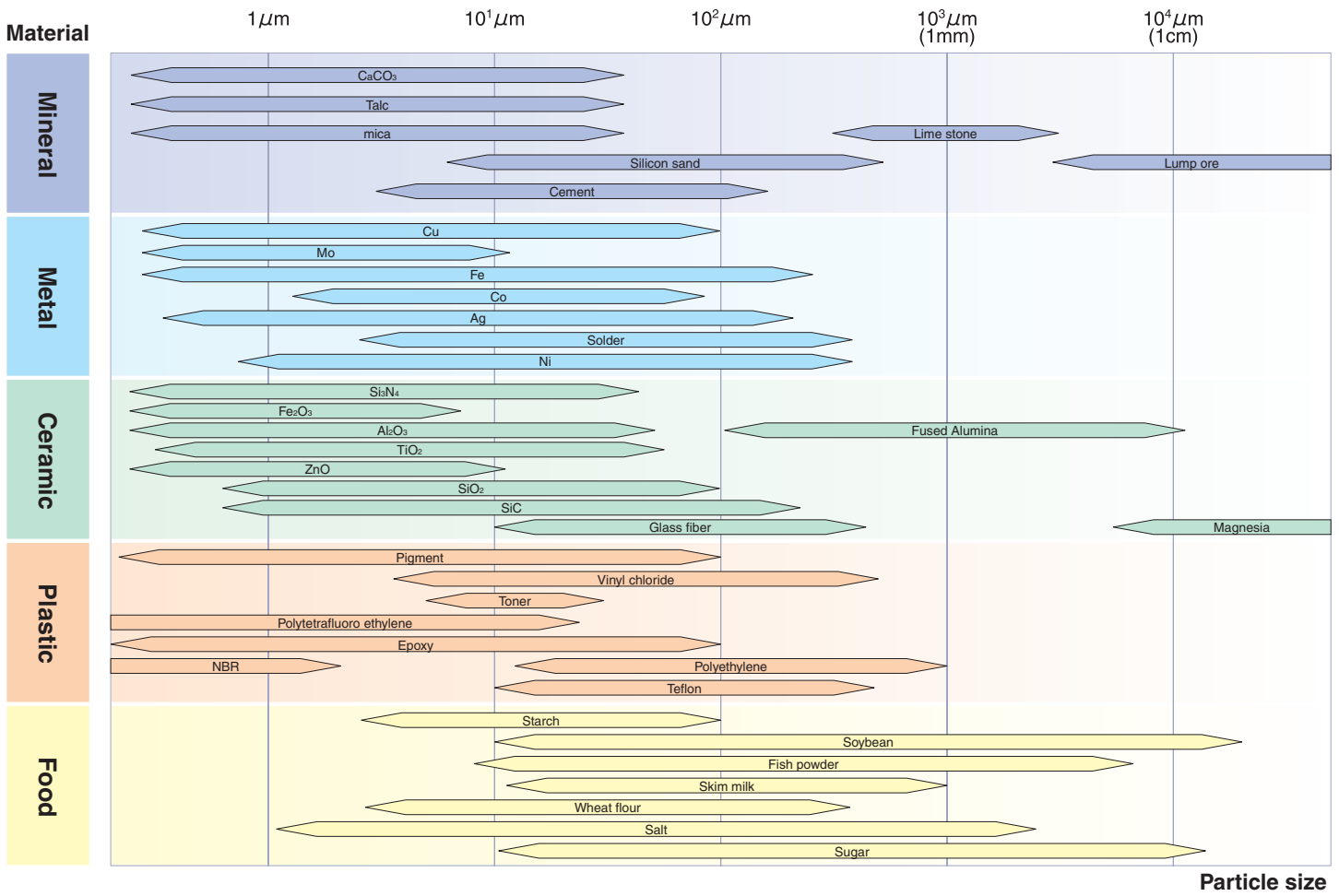
■ Electronic material (solder powder)



■ Chemical (color toner)

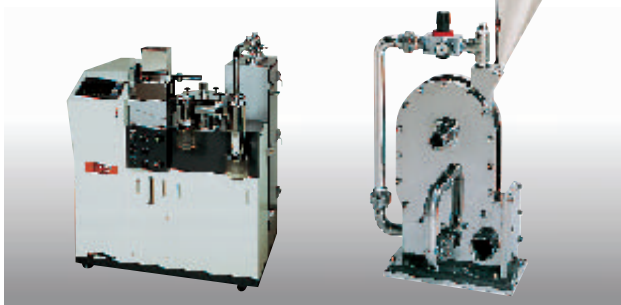


■ Powder material and particle size



Consignment Processing Service, developing based on our affluent experience, advanced technology and state-of-the-art facility

Nisshin Engineering undertakes on the consignment basis, the pulverization, classification and characteristics measurement of the material powder according to the requirements of customers, based on our achievements of processing and measurement of powder over the period. You can make the use of it for your production, research and development of powder products.



Contents of Consignment

■ Pulverization

Pulverization method	Overview	Facility
Fluid energy method	Powder particles are engulfed in the jet and pulverized by the collision of particles with each other.	Current jet.
Roller method	Shearing force is applied to the powder engulfed between the roller and the table to pulverize it.	Super hybrid mill.
High speed method	By passing the powder through the high-speed spiral stream generated by the rotor with unique structure, fine pulverization of the powder is executed.	Super rotor. Blade mill.
	Impact, shearing and friction are applied to the powder residing between the pin attached to the fast revolving disc and the pin attached to the opposite side to pulverize it.	Pin mill. Disc mill.

■ Classification

Classification method	Overview
Air classification method	The turbo classifier developed by us executes the classification of the size from sub micron to hundreds microns, which correspond to sieving method
Sieving method	Classification up to around a hundred microns.

■ Characteristics measurement

Item to measure	Overview
Particle size	Laser diffraction method (Microtrac dry/wet type), sedimentation method (white light transmission method, X-ray transmission method), electric detection method (coulter counter), sieving method, microscope method and specific surface area method
Powder characteristics	Powder tester, true density, shearing force.
Component analysis	Moisture measurement, ash, protein.
Photographing	Scanning electron microscope, optical microscope

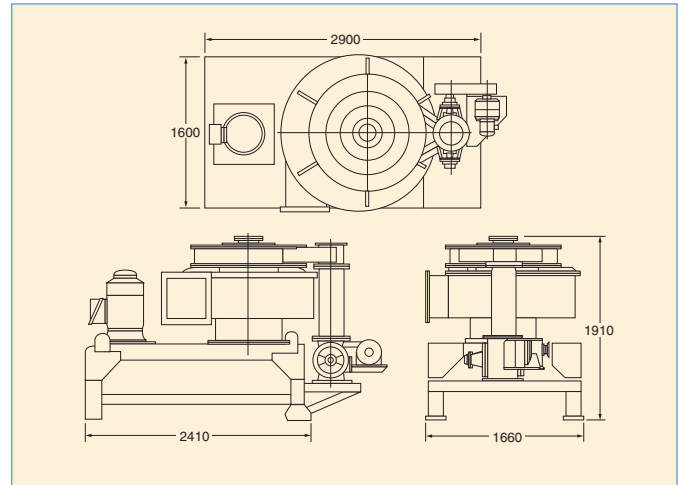
High precision models can cope with various processing amounts.

Material of the powder contact area can be changed according to the powder to process.

Classification under a special environment is also possible.

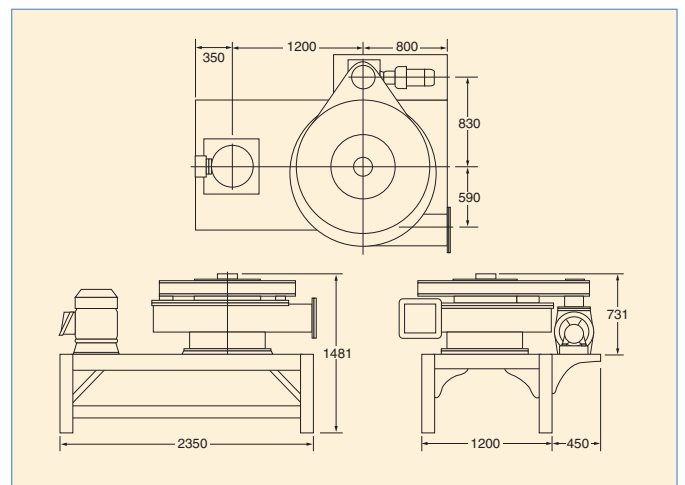
TC-100IV

Large capacity type with twice processing capacity having the same rotor diameter as TC-100 II type.



TC-100 II

Large type model for process use, with high capacity provided to correspond to a large scale plant.



Items Models	Cut point (μm)		Feed rate (kg/h)	Rotor speed (min^{-1})	Airflow rate (m^3/min)	Power consumption (kW)	Weight (kg)
	Fine type	Coarse type					
TC-100IV	2~50	5~120	~8,000	200~2,000	150~300	45~75	5,000
TC-100	2~50	5~120	~4,000	300~2,500	70~120	22~37	1,500
TC-60	1.5~50	5~120	~1,000	300~5,000	30~100	7.5~75	1,000
TC-40	1~50	3~120	~200	300~6,500	15~35	3.7~15	700
TC-25※	0.6~30	2~100	~50	500~7,000	3~9	2.2 12.5	750
TC-15※	0.5~20	2~100	~5	700~11,000	1~3	1.5 3.4	400

There are [II type: ordinary specification type], [III type: jet mill, vertical mill corresponding type] and [IV type: large capacity type (with potential processing capacity twice as much as II type)] as the models larger than TC-40.

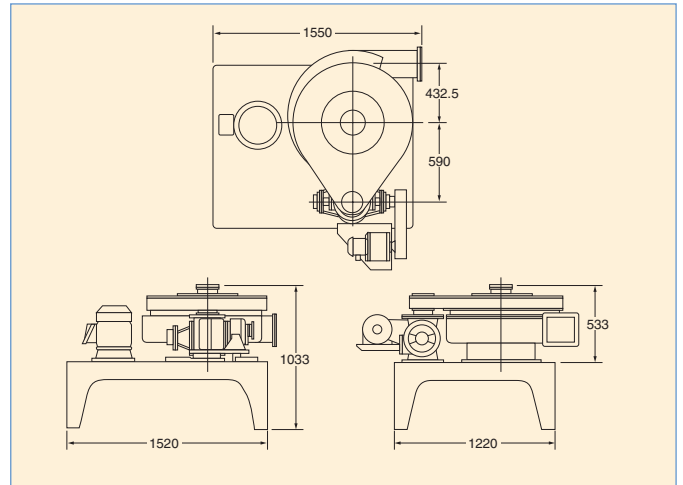
※●As TC-15, there are automatic operation NS type and manual operation MS type, which are system equipment, as well as NSC, MSC types which are coupled with the jet mill.

●As TC-25, there are automatic operation N type and manual operation M type. Also there is III type which has processing capacity one and a half times as much as II type.

* The specifications may be changed without notice.

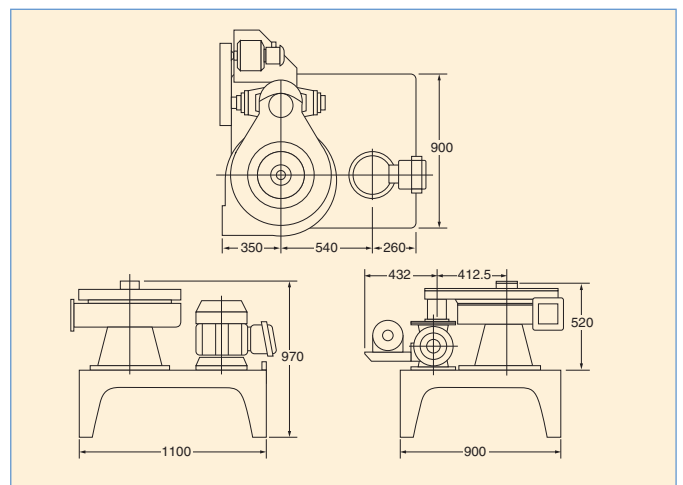
TC-60 II

A standard model for process use, showing superb reliability with its stable classification accuracy.



TC-40 II

A high precision model for process use, covering from high functional electronic material to fine chemical.

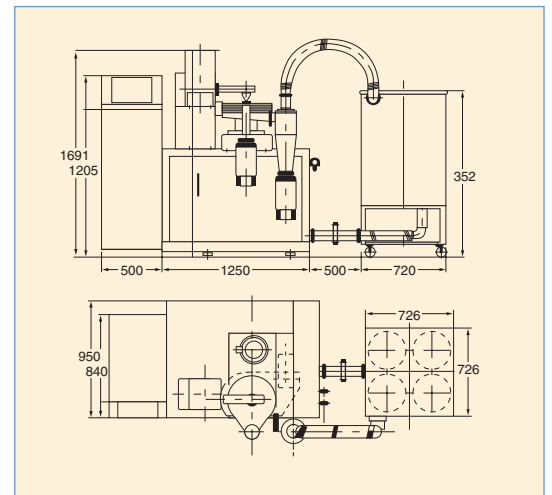
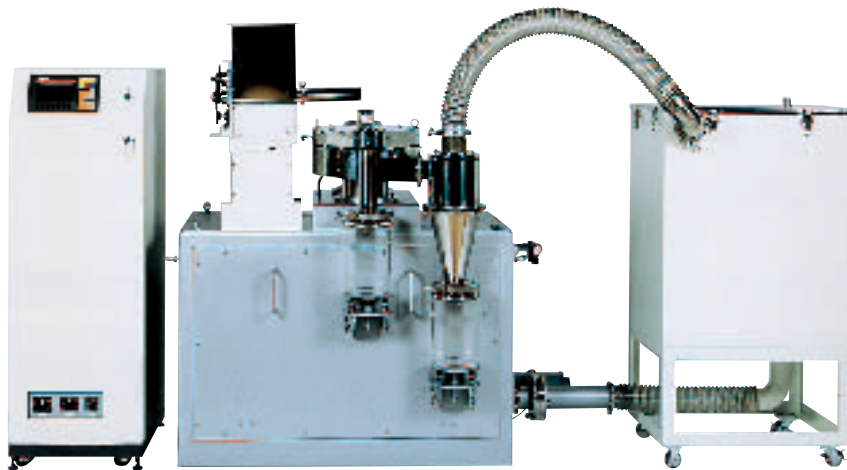


TC-25N

A full automatic type with high accuracy for laboratory use, can be used for process use as well. Equipped with a load cell. Inputting true density of powder and a classification cut point calculates optimal conditions. Coupling with the jet mill is also possible.

A manual operation type with high accuracy for laboratory use, can be used for process use as well. Coupling with the jet mill is also possible.

TC-25M

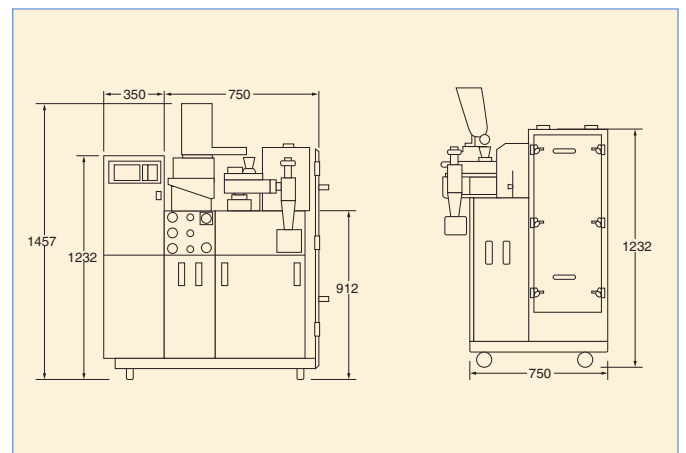


TC-15NS

A full automatic, highly accurate classifier for laboratory use. Improved operability by means of the touch panel. Equipped with a load cell. Inputting true density of powder and a classification cut point calculates optimal conditions. NSC type to be coupled with the jet mill is also available.

A manual operation type with high accuracy for laboratory use. Improved operability by means of the touch panel. MSC type to be coupled with the jet mill is also available.

TC-15MS



APPLICATION SYSTEM

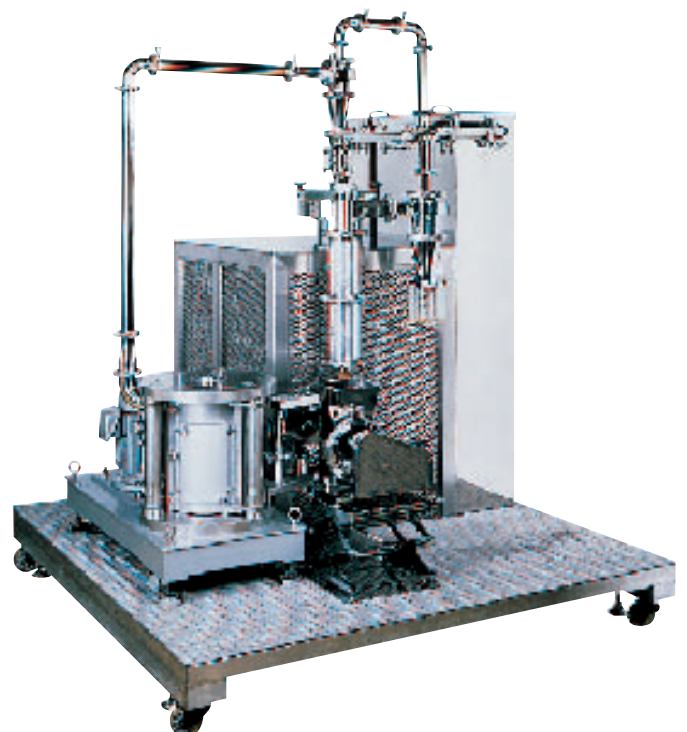
TC-25 Inert gas cycling system

A closed type that realizes highly accurate classification under the atmosphere (with oxygen content under 100ppm) of nitrogen or inert gas. A model corresponding to TC-15・40・60 type is also available.

*Pulverization-classification closed circuit system*

A pulverization-classification system coupling the laboratory use classifier TC-15 with the laboratory use jet mill Current Jet CJ-10.

A highly efficient pulverization-classification system, coupling the laboratory use classifier TC-15 with the laboratory use mechanical pulverizer SR-15.



Powder Technology
& Project Engineering



P&Pで世界を拓く

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