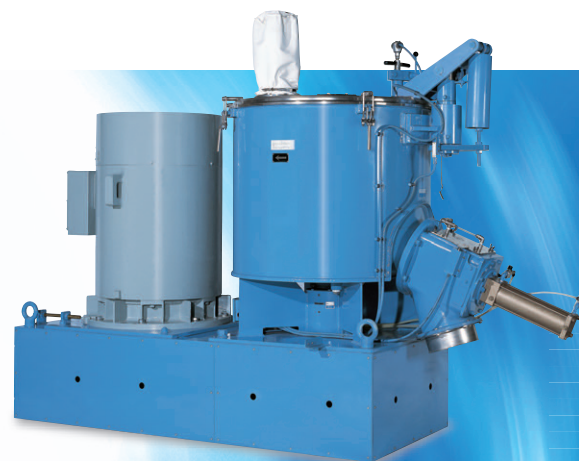


High Performance Fluid-Type Mixer FM-L series

# FM MIXER



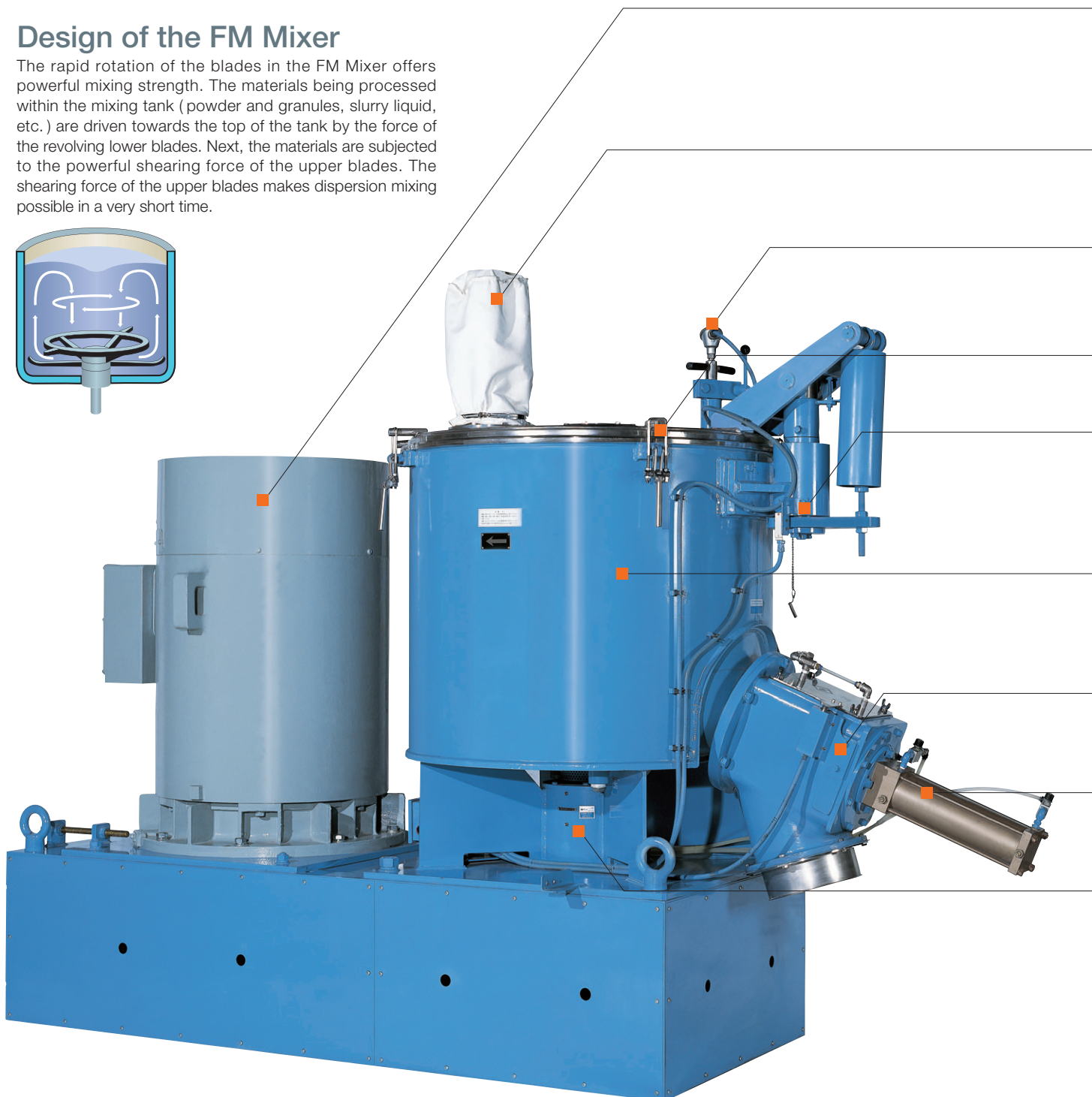
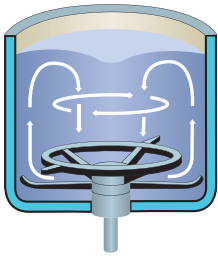
# The FM Mixer surpasses conventional mixing and is a partner for particle design

Over 10,000 FM Mixers have been delivered to domestic and international customers. Expansion into a large-type mixer is possible. A wealth of processing know-how for all unit operations (8,000 liter performance).

The FM mixer was born from advanced powder and granule processing technology. The reliability of the FM Mixer is proven by the more than 10,000 mixers which are already in use by our customers.

## Design of the FM Mixer

The rapid rotation of the blades in the FM Mixer offers powerful mixing strength. The materials being processed within the mixing tank (powder and granules, slurry liquid, etc.) are driven towards the top of the tank by the force of the revolving lower blades. Next, the materials are subjected to the powerful shearing force of the upper blades. The shearing force of the upper blades makes dispersion mixing possible in a very short time.





# machines

## Motor

Standard mixers are equipped with a dual transmission. Both power constant operation and pattern operation are made possible by the use of an inverter motor (optional). (Inverter motor is standard for FM10C/I and 20C/I mixers.)

## Ventilation Filter

Maintains the inside of the mixing tank at atmospheric pressure and prevents the dispersion of the materials being processed.

## Temperature Sensor

Automatic operation using temperature control is made possible by measuring the product temperature.

## Lid Clamp

Allows for easy securing of the lid.

## Lid Rotation Mechanism

When the lid clamp is released, the lid can be opened and closed in a horizontal position. (Lids for the FM10C/I, 20C/I, 75L, and 150L open and close vertically.)

## Mixing Tank

The interior of the tank has a buffed finish, and the outside and bottom of the tank are equipped with a jacket. (The installation of insulating material around the periphery of the jacket is optional.)

## Exhaust Valve

Allows for easy cleaning of the tank interior. Eliminates dead space within the mixing tank.

## Air Cylinder

Use for opening and closing the exhaust valve. (FM10C/I and 20C/I are opened and closed manually.)

## Axle Bearing

Replacement of the bearing is possible without removing the mixing tank.


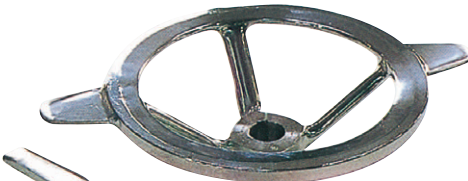
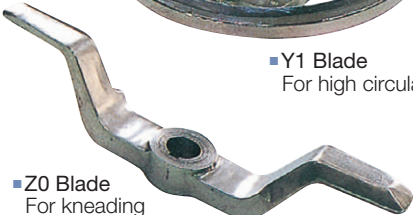

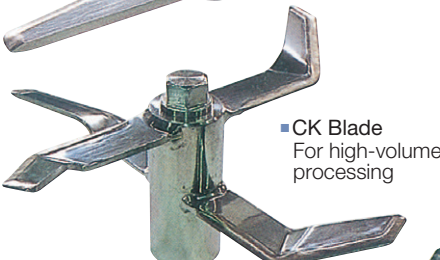

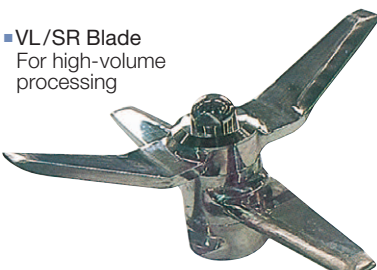
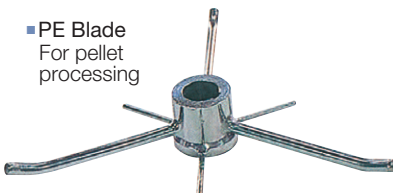
## Features

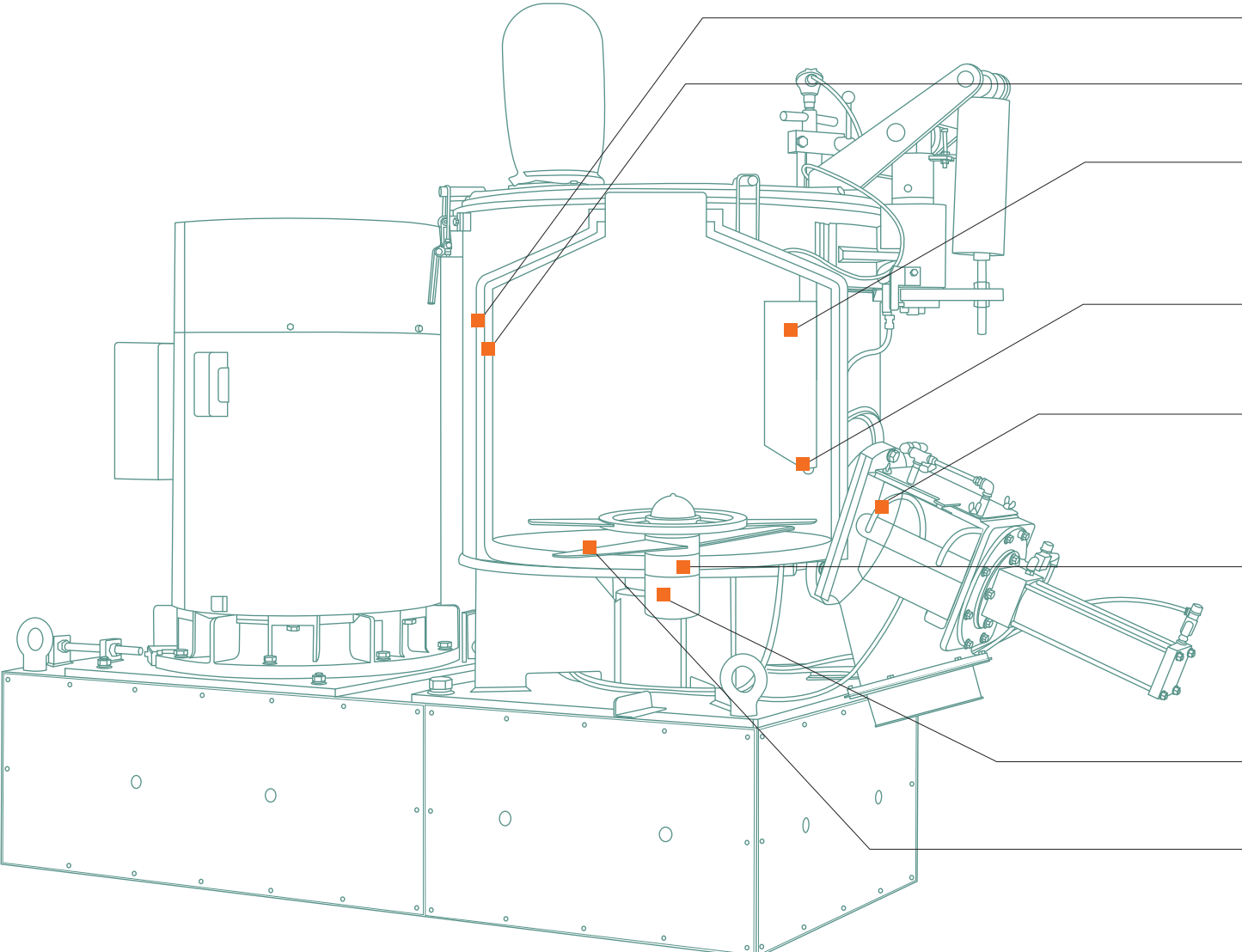
- 1 Processing is possible in a short period of time.
- 2 A wide range of processing can be performed, including mixing, dispersion, drying, granulation, grinding, surface modification, and complexification.
- 3 A filling capacity of 90% is realized thanks to the multi-blade design.
- 4 Ultra high-speed specifications available (blade tip speed of up to 100 m/s)
- 5 A wide variety of options are available, including vacuum capability, abrasion resistance, support for GMP standards, installation of a chopper, installation of a scraper, the use of compressed air, and installation of an inverter motor.
- 6 Designed for easy maintenance, inspection and cleaning.
- 7 A wide variety of machine types are available to support every use.

# Types and Usage of Mixer Blades

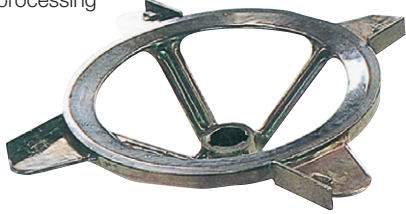

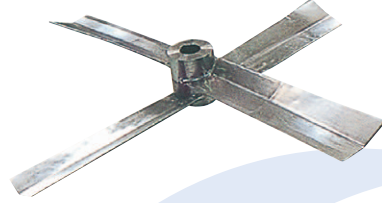
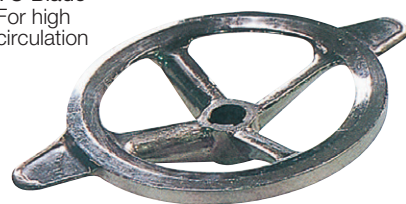

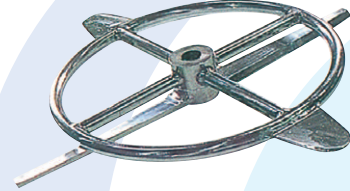
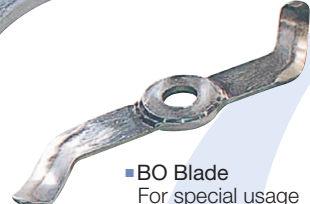
## For Heater Mixers

### Upper Blades

 <p>■ ST Blade (standard) For general usage</p>  <p>■ Y1 Blade For high circulation</p>  <p>■ Z0 Blade For kneading</p>	 <p>■ SR Blade For grinding</p>  <p>■ CK Blade For high-volume processing</p>  <p>■ PO Blade For molten materials</p>	<h3>Custom Blades</h3>  <p>■ VL/SR Blade For high-volume processing</p>  <p>■ PE Blade For pellet processing</p>
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		For Cooler Mixers	
		Lower Blades	Upper and Lower Blades
<ul style="list-style-type: none"> <li>■ Y1 Custom Blade For high-pressure processing</li> </ul> 	<ul style="list-style-type: none"> <li>■ AO Blade (standard) For general usage</li> </ul> 	<ul style="list-style-type: none"> <li>■ CD/CD Blade (standard) For cooling</li> </ul> 	
<ul style="list-style-type: none"> <li>■ YO Blade For high circulation</li> </ul> 	<ul style="list-style-type: none"> <li>■ SO Blade For high-circulation, high-pressure</li> </ul> 	<ul style="list-style-type: none"> <li>■ CR/CA Blade For mixing</li> </ul> 	
	<ul style="list-style-type: none"> <li>■ BO Blade For special usage</li> </ul> 		

### Insulating Material (optional)

### Jacket

### Deflector

Increases the effectiveness of mixing by directing the materials being processed towards the center of the tank.

### Temperature Sensor

Automatic operation using temperature control is made possible by measuring the product temperature.

### Compressed Air Nozzle

After discharging the material, compressed air is used to prevent adherence to the inside of the discharge valve casing.

### Axis Seal

Prevents leakage of powder (an oil seal is used). An air seal (optional) can be used together with the oil seal for enhanced leakage prevention.

### Bearing

Provides precision support for the revolution of the axis.

### Upper and Lower Blades

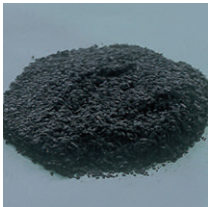
These blades offer the optimum design for efficient, high-quality processing.

# Materials Processed by the FM Mixer and

The FM Mixer has an outstanding record of performance in industries ranging from chemical engineering to the food industry. The flexible design of the mixer allows processing of a wide variety of materials.

## Examples of Performed by

Paper shredding (crushing)



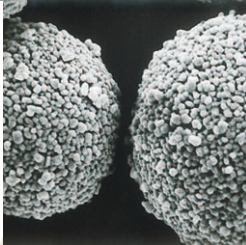
Coal powder+tar pitch (granulation)



Ceramic powder (granulation)



Dry blend soft PVC (heating and mixing)



Nylon+TiO<sub>2</sub> (complexification)

### Electrical and Battery Materials

Carbon, PZT, barium titanate, lithium

### Toners

Black toner, color toner

### Inks, Paints

Various types of inks and paints, metallic paints

### Plastics

Composite plastics, PP, PE, ABS, PVC, PC, PET, phenol, epoxy, nylon, engineering plastics, etc.

### Powder Paints

### Agrochemicals

Herbicides, vermicides

### Pigments

Various types of pigments, dry color, color pellets

### Animal Feed/Fertilizers

Fertilizers, soil conditioners

### Rubber, Glues

Vibration absorbing rubber, silicon, various types of glue

## Mixing, Dispersion

Uniform mixing is achieved in a short time for two or more types of materials by using high powered convection mixing, diffusion mixing, and shearing mixing. A mere two to three minutes is enough time for processing of materials.

## Drying, Solvent recovery

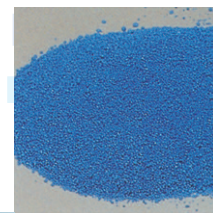
Heat agitation and heating from the jacket makes drying possible under normal pressure, decompression and vacuum conditions. The grinding and crushing function of the blades allows granularization of the mixing function substances to be performed at the same time that materials are being mixed. Solvent recovery can also be performed by adding a condenser.

## Surface Coating/Modification, and Complexification

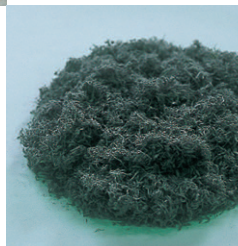
Even coating is achieved in a short period of time thanks to the intensive movement of materials within the mixing tank. The mixer can also be used to color of pellets and to coat calcium carbonate with fatty acids or coupling agents.

# Users of the FM Mixer

PVC+pigment  
(dispersion mixing)



Calcium carbonate+fatty acids  
(surface modification)

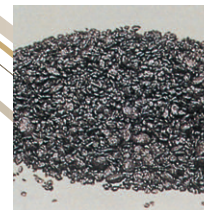


Polyethylene+paper  
(heat granulation)

PE pellet+carbon  
(mixing)



Cosmetics  
(foundation)  
(dispersion mixing)



Alumina+graphite  
(mixing)

## Processing the FM Mixer

### Ceramics

Alumina, silicon carbide, silicon nitride, zirconia

### Magnetic Material

Hard ferrite, soft ferrite, neodymium, samarium cobalt

### Foodstuffs

Mustard, wasabi, soup base

### Cosmetics

Foundation, eye shadow

### Powder Metallurgy Materials

Steel powder, carbide, other metals

### Medicine

Poultice solution, cold medicine, crude drugs

### Paper manufacturing related

Pulp, calcium carbonate, coal

### Recycled Materials

Plastic waste, wood resins, used paper

### Other

Pencils, crayons, construction materials, cements

## Heating and Mixing

Heating and mixing of materials is performed using powerful churn blending heat and heating from the jacket.

## Granulation

Granulation is possible using a binder or by heat melting. Various types of complexification granulation processing can be performed, such as by adding wood powder to polypropylene to process the wood resins, or adding talc to polypropylene to create materials for tableware.

## Grinding, Crushing

Materials composed of resin (records, etc.), metal-oxide materials, seashells, and eggshells can all be ground and crushed.

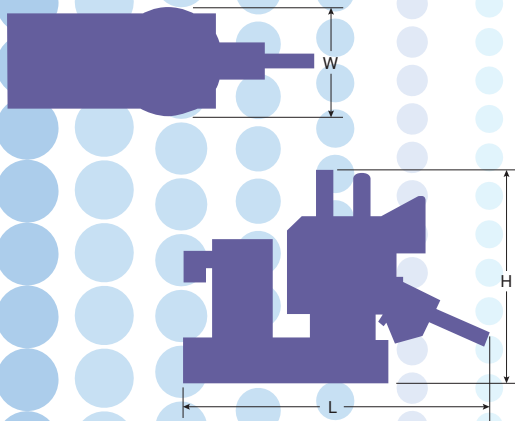
## Dissolution, Paste Processing

The processing is also possible for liquids and pastes such as hot-melt, chocolate, butter, coating putty, bees-wax, and poultice medicine.



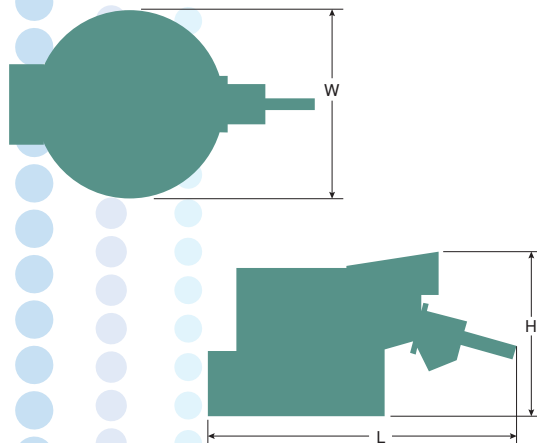
# External Measurements and Standard Specifications Heater Mixers and Cooler Mixers

## Heater Mixer FM10~FM1000



Model	Total capacity (ℓ)	Processing capacity (ℓ)	Height (mm)
FM10C/I	9	6	775 (985)
FM20C/I	20	12	930 (1,200)
FM75L	75	50	1,440 (1,730)
FM150L	150	100	1,580 (2,010)
FM300L	300	200	1,800 (1,900)
FM500L	500	330	2,030 (2,160)
FM1000LP	1,000	660	2,550 (2,720)

## Cooler Mixer FD20~FD1000



Model	Total capacity (ℓ)
FD20C/K	45
FD150L/K	350
FD300L/K	650
FD500L/K	1,050
FD1000L/K	2,600

# ations for

## Note

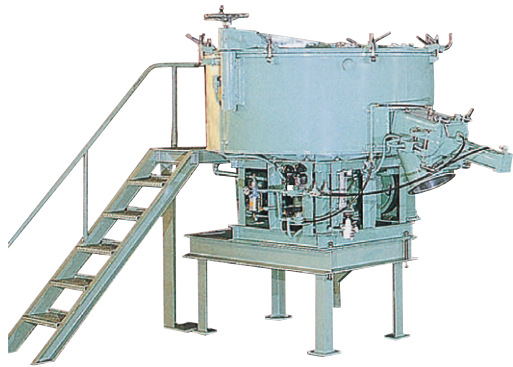
1. The values listed in parenthesis for height, width, and length are the maximum measurements including stroke movement of the deflector, lid, and exhaust valve.

2. The motor output shown reflects standard specifications.

Width (mm)	Length (mm)	Motor output (kW)	Opening and closing of lid	Exhaust valve	Mass (kg)	Notes
330	900 (1,000)	2.2	Vertical open	Manual	140	Inverter
500	1,060 (1,180)	3.7	Vertical open	Manual	200	Inverter
600 (850)	1,870	18.5/9.3	Vertical open	Pressurized	600	Dual transmission
720 (910)	2,070	30/15	Vertical open	Pressurized	1,000	Dual transmission
920 (1,530)	2,640	55/27	Horizontal open	Pressurized	1,800	Dual transmission
1,040 (1,740)	2,980	75/37	Horizontal open	Pressurized	2,200	Dual transmission
1,270 (2,130)	3,600	150/75	Horizontal open	Pressurized	5,500	Dual transmission

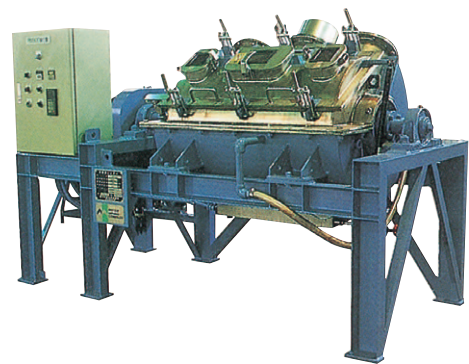
Processing capacity (ℓ)	Height (mm)	Width (mm)	Length (mm)	Motor output (kW)	Opening and closing of lid	Exhaust valve	Mass (kg)	Notes
15	900	600	1,090 (1,240)	2.2	Vertical open	Manual	250	Inverter
100	1,580	1,200 (1,800)	1,800	7.5	Horizontal open	Pressurized	850	
200	1,860	1,300 (2,060)	2,350	11	Horizontal open	Pressurized	1,000	
330	1,730	1,600 (2,500)	2,800	15	Horizontal open	Pressurized	1,600	
660	2,130	2,270 (2,800)	3,680	30	Horizontal open	Pressurized	4,000	

# Sister Products of the FM Mixer



## Cooler Mixer (FD Model)

- For cooling in combination with FM model, or for simple mixing as a single unit.



## Cooling Blender (RM Model)

- A full-jacket cooling blender. For cooling in combination with FM model, or for simple mixing as a single unit.



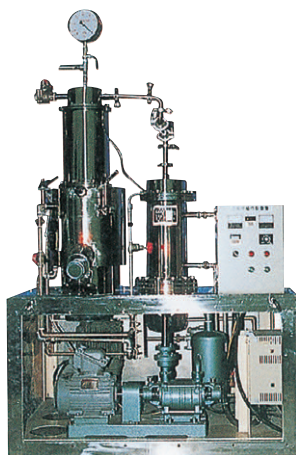
## Mechano Hybrid (MH Model)

- Features a rounded mixing tank.
- Use for high-dispersion processing, complexification, and surface modification.



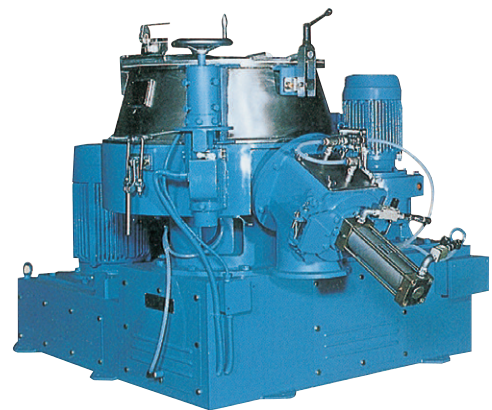
## RC Type

- The Tank can be disassembled easily, and washable by water.
- Avoid heating, contamination by adopting Non-contact seal.



## Vacuum Drying System

- The FM Mixer, bag filter, condenser, and vacuum pump come as a single unit.



## TM Model Granule Mixer ("Ryu-O")

- Double-axis reverse mixer
- A dedicated granule mixer with maximized shearing and rolling.



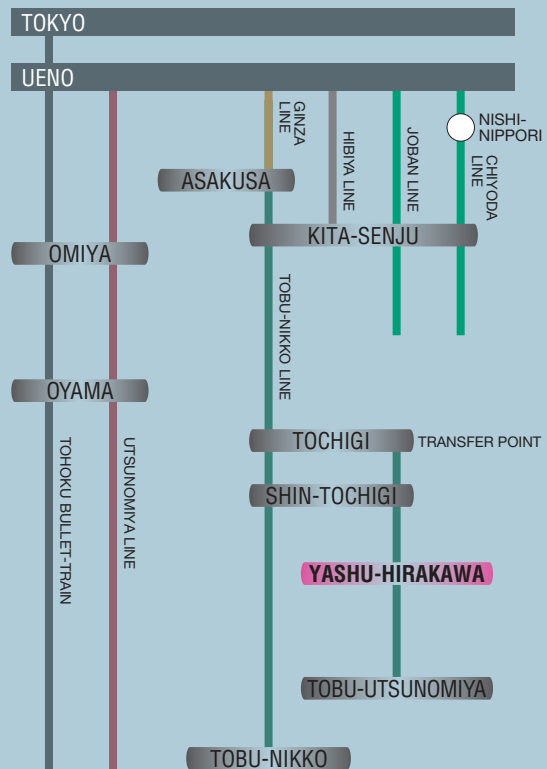
## Research and Development Center

The new technology of the FM Mixer comes out of our Research and Development Center.

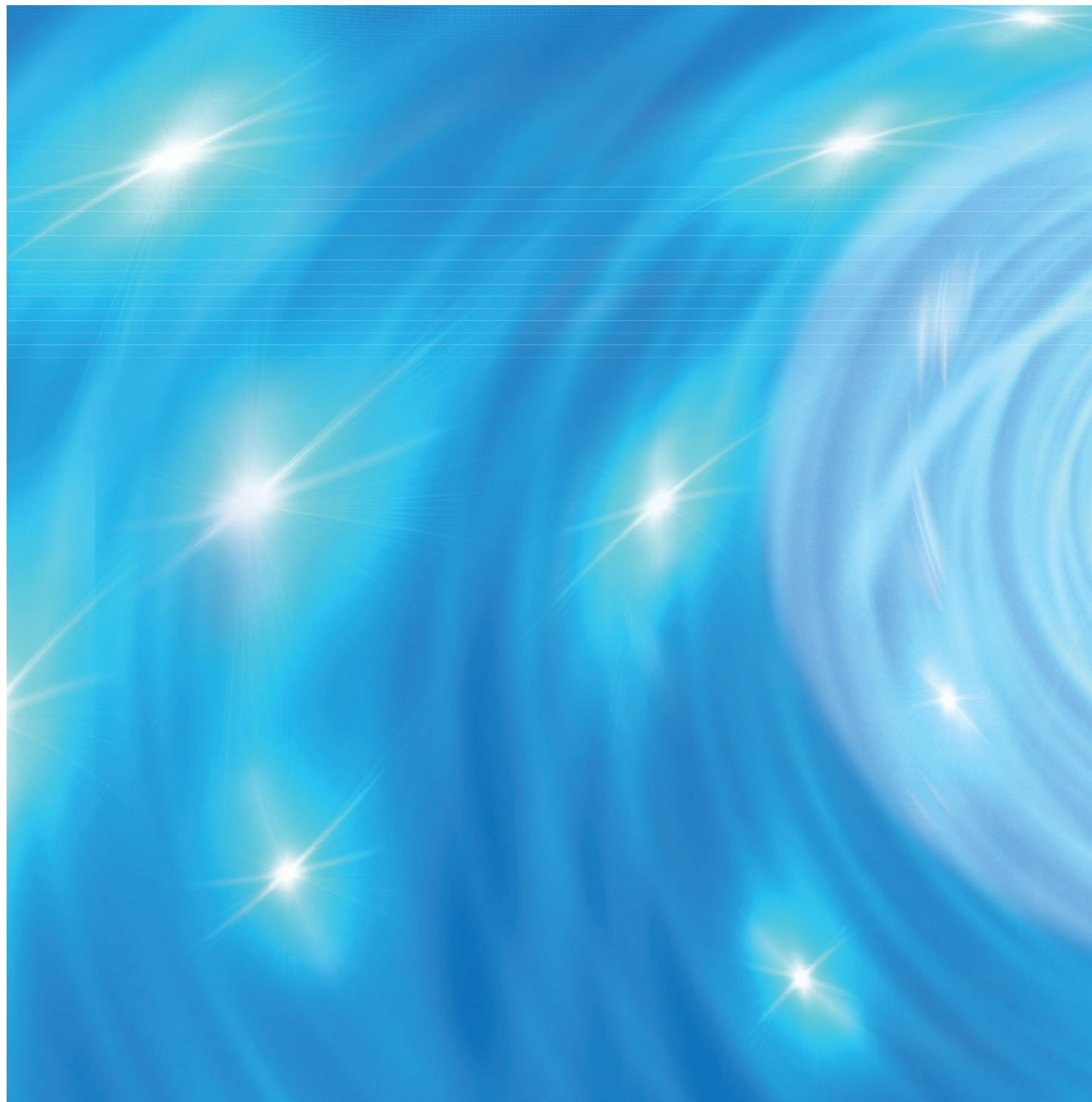
At the center, in addition to application and technology development, the full range of test machines has been prepared for tests required by customers. To make a request, please contact any operations department or branch office of Nippon Coke & Engineering Co., Ltd., or the Research and Development Center.



- Tohoku Expressway Tohigi Interchange to Utsunomiya Road ..... 10 minutes
- Oyama Station (via JR Tohoku Bullet-Train or Utsunomiya Line) then transfer to taxi ..... 20 minutes
- Tobu Railway Shin-Tochigi Station (via Nikko-Kinugawa Line) then transfer to taxi ..... 5 minutes
- Yashu-Hirakawa Station (via Tobu-Utsunomiya Line) then by foot ..... 8 minutes



Due to product improvements, the contents of this catalog are subject to change without notice.



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