Beads Crusher µT-01/01N

Strong crushing and High stability using High speed pendular swinging. A model equipped with Shaking speed stepless setting and Memory function as a new line-up.

•Micotubes that are used with Beads crushers --> P.102 •The data of temperature of crushed samples with this unit --> P.103
•Use of various types of crushers --> P.104

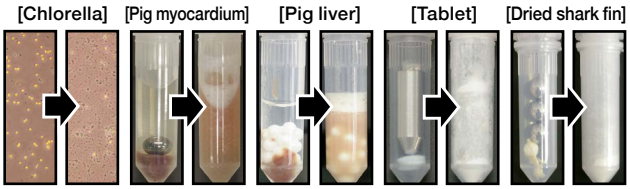
Features

- Outstanding stability even with high spped shaking at 4600 r/min
- For one simple 2 mL Microtube (Throughput 0.2 g)
- Stainless steel beads and Metal crusher can be used

Applications

- Crushing of Microbes (bacteria, chlorella, yeast) and Insects
- Crushing of Cells, Tissues and Organs of animals and plants
- Crushing of Tablets and Resin pellets (with low viscosity)

Examples These are a few examples.



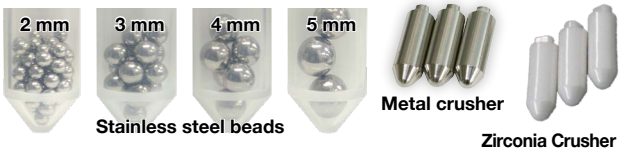
Beads crushing method

This method is adapted to extract nucleic acids, proteins and residual substances from biological/environmental samples. Nucleic acids are often fragmented and basically served for PCR templates and not suitable for genome extraction. Used for human DNA identification, drug toxicological examination from human hair, seed quality examination, examination of BSE and Johne's disease, investigation of soil microflora, etc. and also sample preparation for spectroscopic analysis for resin.

Model	µT-01	µT-01N
Crushing method	Crushing beads with pendular swing method	
Shaking speed	2500 to 4600 r/min (6-step setting) (*1)	2000 to 4600 r/min (Stepless setting: per 100 r/min) (*1)
Capacity	1.5/2.0 mL Screw cap microtube(Outer diameter below 11 mm of the body of Microtubes can be used.)(*2)	
Applicable beads	Non-metal beads, Stainless steel beads, Metal crusher, Zirconia Crusher (*1) (*3)	
Ambient temperature	5°C to 35°C (No condensation) (*4)	
Speed memory	-	Setting
Timer	6-step setting (5, 10, 15, 30, 45, 60 seconds) (*1)	-
Safety devices/functions	Braking when cover is open during operation, Motor stopping when cover is open, Motor overcurrent protection	
Dimensions (W×D×H)/Weight	175 × 280 × 160 mm, Approx. 5 kg	
Power supply	AC100V-240V/0.5A (universal power supply)	

(*1)Set below 4000 r/min and 15 seconds when using Metal crusher.
(*2)Refer Recommended Microtubes on page 102.
(*3)Stainless steel beads and Metal/Zirconia crusher are available as an option. Marketed Glass and Zirconia beads can be used.
(*4)An actual shaking speed may be slower than that of specs due to load.

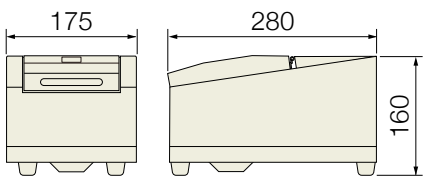
Optional parts



Product Name/Model	Remarks
Stainless steel beads ϕ2 mm	70 g (approx. 2100 pcs)
Stainless steel beads ϕ3 mm	150 g (approx. 1300 pcs)
Stainless steel beads ϕ4 mm	150 g (approx. 560 pcs)
Stainless steel beads ϕ5 mm	150 g (approx. 280 pcs)
Mixed Stainless steel beads	ϕ2 pcs/20 g, 3 pcs/40 g, 4 pcs/40 g, 5 pcs/50 g
Metal crusher	2 mL Microtube (Conical bottom) 6 pcs
Zirconia crusher	2 mL Microtube (Conical bottom) 3 pcs

•Stainless steel beads and Metal crusher are made of stainless steel.

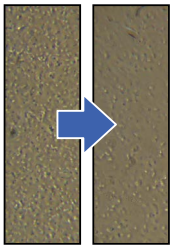
Dimensions (µT-01 and µT-01N are the same)



μT-12 Sample Crushing Example and Holder Usage

μT-12 Details of sample crushing example and the holders used

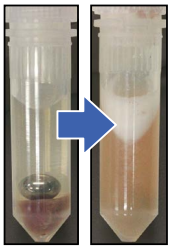
① E. coli (1 mL of bacterial solution suspended in Buffer)



Beads: Zirconia beads ϕ0.2 mm
Tube: 2 mL Screw cap microtube
3200 r/min, 180 s

Microtube holders for use
Versatile, high capacity holder. 1.5/2 mL Screw cap microtubes × 6

② Pig myocardium 100 mg



Beads: SUS beads ϕ5 mm × 1
Tube: 2 mL Screw cap microtube
Solvent 1 mL, 3200 r/min, 30 s

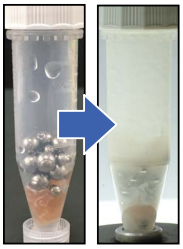
Microtube holders for use
For heat-sensitive samples, pre-cooling the holder in a freezer (up to -20°C) before use is recommended.
1.5/2.0 mL × 3

③ 1 g raw rice, crushing without Buffer

Beads: SUS beads ϕ10 mm × 2
Tube: 5 mL Screw cap freestanding tube
No solvent. 2000 r/min, 1 min

Microtube holders for use
Large 10 mm diameter beads with high crushing power and about 1 g sample.
5 mL × 1
For crushing Dry matter.

④ 1 g pig belly, crushing with Buffer



Beads: SUS beads ϕ5 mm × 8 + ϕ3 mm × 10
Tube: Eppendorf 5 mL Screw cap tube
Solvent 500 μL, 2000 r/min, 1 min

Microtube holders for use
Eppendorf 5 mL Screw cap tube and this holder are recommended if you want to crush a sample of about 1 g with solvent.

Selection of Beads and Microtubes for Bead Crushing

Bead Selection Criteria

What are the sample types?

Animal cells and tissues/ Plant cells and tissues

What is the shape of the sample?

Tubular, larger than a few millimeters
Tissue fragment

3 to 5 mm stainless steel zirconia
3 mm: 1 to 15 pcs
4 mm: 1 to 6 pcs
5 mm: 1 to 3 pcs

Metal/Zirconia crusher for hard samples

Granules less than 2 to 3 mm
Cultured cells, etc.

1 to 3 mm stainless steel zirconia
1 to 2 mm : 1/3-1/2 capacity of tube
3 mm : 1 to 15 pcs

Microbes

Eukaryotic microbes
Yeast
Fungi
Protists
Algae, etc.

0.5 mm glass zirconia
1/3-1/2 volume of tube

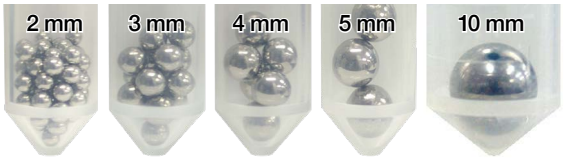
Eubacteria
Gram-positive bacteria
Gram-negative bacteria

Archaea
Thermophiles
Halophilic bacteria, etc.

0.2 to 0.5 mm glass zirconia
1/3-1/2 volume of tube

For hard samples, mix large and small beads.

Stainless steel beads



Metal crusher

•The weight is stainless steel > zirconia > glass, and the crushing power increases in that order. 0.2 mm and other fine zirconia beads are expensive. Increase the crushing time when using more affordable glass beads.

•Stainless steel beads and metal crushers, and zirconia crushers are sold separately.
•Use commercially available glass and zirconia beads.
•The number of beads is an example for 2 mL tubes. For 5 mL tubes, increase the bead volume as needed.

Data on the temperature of samples when crushing

Data on the heat generation of samples when crushing in µT-12

Data on the heat generation of samples when crushing in µT-12

In Crushing of samples with beads in µT-12, we found that the sample temp. did not rise even when the sample of RT was broken. The heat generation can be further reduced by pre-cooling the sample and/or the sample below RT can be kept with the holder for cold storage (TH-0203) after crushing it.

Vessels	Bead types and Shaking conditions	Temperature inside the vessels before shaking	Vessel temperature inside after shaking for each holder	
2.0 mL Screw cap Microtube	φ3 mm zirconia × 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	+23.5°C	6 pcs-holder	+27.8°C
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	+22.5°C
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	+16.3°C
	φ3 mm stainless steel × 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	+23.5°C	6 pcs-holder	+25.8°C
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	+23.2°C
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	+17.0°C
	φ5 mm stainless steel × 2 water 0.5 mL Shaking for 60 seconds at 3200 r/min	+23.0°C	6 pcs-holder	+25.1°C
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	+22.9°C
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	+17.5°C
	Metal crusher × 1 no solvent Shaking for 30 seconds at 2500 r/min	+23.3°C	6 pcs-holder	+29.3°C
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	+24.3°C
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	+19.2°C
5.0 mL Screw cap Test tube	φ5 mm stainless steel × 15 water 2.0 mL Shaking for 60 seconds at 2500 r/min	+23.3°C	+25.4°C	

•The sample temp. before and after shaking measured with thermocouple in each condition. •After shaking, the sample temp. with stainless steel beads rose about 2°C and that with zirconia beads and Metal crusher rose about 4°C and 6°C respectively. •The sample temp. was almost constant before and after shaking when using 3 pcs-holder for cold storage with sufficient pre-cooling in a refrigerator (4°C). •The sample temp. dropped by about 5°C on average compared to before shaking when using 3 pcs-holder for cold storage that was fully precooled in the freezer (-10°C). •Do not cool the 3 pcs-holder for cold storage at temp below -20°C. It may cause the screws get loosen from metal shrinkage. •Do not use tubes that have been cooled directly at negative temp. The tubes will be easily broken.

About 2 mL recommended tubes

❶SARSTEDT made 72.693 for less than φ3 mm beads (Crushing of Bacteria and Yeast).

❷Scientific Specialties Inc. (US) made 2641-0B for φ4 to 5 mm beads or Metal crushers (Animals and Plants cell and Rigid samples). SARSTEDT 72.693 could be used for low speed. See the right page for details.

[Impact-resistant tubes for use with φ4 to 5 mm beads and metal crushers]
Shatter Resistant 2.0 mL Tube & Cap
Made by Scientific Specialties Inc. (US)

The strength test of this impact-resistant tube resulted in no damage even if it was shaken with φ5 mm Stainless steel beads and Metal crashers in µT-01/µT-12, as long as it is within the speed limit. (See the “Details for Scientific Specialties-made Microtubes” on the right page.)
In fact, this tube is slightly difficult to tell whether the sample can be crushed well due to its white translucent color.
Therefore, SARSTEDT 72.693 is recommended if you prefer a tube that is highly visible inside.
Please note that SARSTEDT has a speed limitation. (See the “Limitation on SARSTEDT 72.693 on the right page.)
This tube is recommended for the crushing of rigid tissue or plant seeds.

µT-12 About 5 mL recommended tubes

TH-0501

Optional holders for µT-12
•QSP Transport Tube 5 mL (580-GRD-Q) is recommended as a 5 mL freestanding tube for TH-0501. For dry matter. up to 2200 r/min for 1 × Φ10 mm SUS bead, up to 2000 r/min for 2 beads.

TH-0501EP

•Use the dedicated TH-0501EP holder for Eppendorf 5 mL tubes.
The maximum diameter of beads that can reach the tip of the tube is 3 mm. When crushing, use beads with a diameter of 3 mm or less, or mix beads of different sizes.