

# Beads Crusher $\mu$ T-12

**Strong crushing by High speed pendular swinging for various samples. 5 mL tubes can be used. Suitable for Molecular biological applications. Low heat generation due to friction.**

- Microtubes 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

- Powerful crushing with the speed of 3200 r/min and large amplitude
- Up to 12 tubes of 2 mL Microtubes, 5 mL can also be used
- The throughput are 0.2 g/2 mL and 1 g/5 mL Microtubes

## Applications

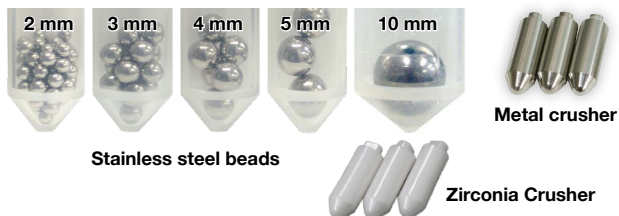
- Crushing of Microbes (bacteria, chlorella, yeast) and Insects
- Crushing of Cells, Tissues and Organs of animals and plants
- Crushing of Hair for analysis and Tablets, etc.

### Optional accessories: Microtube holders



Model	Product Name/Remarks
<b>TH-0206</b>	<b>1.5/2.0 mL Screw cap Microtube 6 pcs-Holder</b>
<b>TH-0203</b>	<b>1.5/2.0 mL Screw cap Microtube 3 pcs-Holder for cold storage</b> The cold-keeping property of the sample can be increased by keeping it in the refrigerator (The screw should be loosened at below -20°C. Make sure not to refrigerate the microtube directly at below 0°C).
<b>TH-0501</b>	<b>5.0 mL Screw cap Microtube 1 pc-Holder</b> "QSP Transport Tube 5 mL" (580-GRD-Q) is recommended. Unsuitable for Eppendorf tubes.
<b>TH-0501EP</b>	<b>5.0 mL Screw cap Microtube Holder for Eppendorf</b> 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.

### Optional parts



Product Name/Model	Remarks
<b>Stainless steel beads <math>\phi</math>2 mm</b>	70 g (approx. 2100 pcs)
<b>Stainless steel beads <math>\phi</math>3 mm</b>	150 g (approx. 1300 pcs)
<b>Stainless steel beads <math>\phi</math>4 mm</b>	150 g (approx. 560 pcs)
<b>Stainless steel beads <math>\phi</math>5 mm</b>	150 g (approx. 280 pcs)
<b>Mixed Stainless steel beads</b>	$\phi$ 2 pcs/20 g, 3 pcs/40 g, 4 pcs/40 g, 5 pcs/50 g
<b>Stainless steel beads <math>\phi</math>10 mm</b>	150 g (approx. 36 pcs) (*)
<b>Metal crusher</b>	2 mL Microtube (Conical bottom) 6 pcs
<b>Zirconia crusher</b>	2 mL Microtube (Conical bottom) 3 pcs

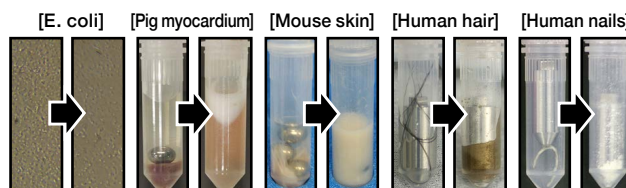
(\*) For 5 mL Microtubes  
• Stainless steel beads and Metal crusher are made of stainless steel.



$\mu$ T-12 with Optional Microtube holders

### Examples

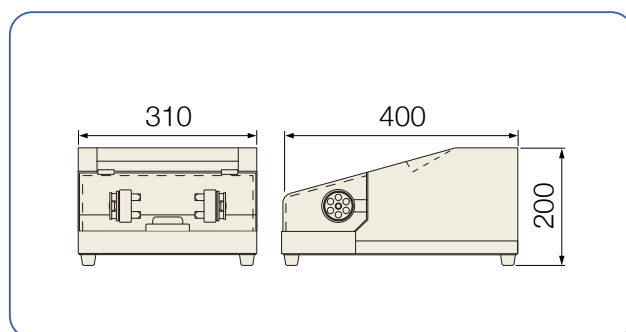
These are a few examples.



Model	$\mu$ T-12
Crushing method	Crushing beads with pendular swing method
Shaking speed	1800 to 3200 r/min (8-step setting) (*1)
Capacity	1.5/2.0 mL Screw cap microtube: Max. 12 pcs (*2) 5.0 mL Screw cap tube: Max. 2 pcs (*3)
Applicable beads	Non-metal beads, Stainless steel beads, Metal crusher, Zirconia Crusher (*4)
Ambient temperature	5°C to 35°C (No condensation)
Timer/Memory	1 to 300 seconds (Per 1 second setting. Up to 2 parameter settings can be memorized)
Safety devices/functions	Braking when the cover is open during operation, Motor overcurrent protection
Dimensions (WxDxH)/Weight	310 x 400 x 200 mm, Approx. 15 kg
Power supply	AC100V-240V/4A (universal power supply)

(\*1) Set below 2500 r/min and within 30 seconds when using Metal crusher and 5 mL Tubes.  
(\*2) Refer Recommended Microtubes on page 102. Maximum 12 pcs when using Metal crusher.  
(\*3) "QSP Transport Tube 5 mL" (580-GRD-Q) is recommended. (\*4) Stainless steel beads and Metal/Zirconia crusher are available as an option. Marketed Glass and Zirconia beads can be used.

### Dimensions



NEW

Constant temperature incubator/shaker  
OD Monitor

For cell culture related products

Shaker

Mixer  
Rotator  
Stirrer

Bead beater  
Ultrasonic homogenizer

Aluminum block Bath  
Mini-size Bath

Water bath  
Shaking Water bath  
Immersion cooler

Hybridization  
Incubator  
Constant temperature Chambers

Centrifugal concentrators  
Cold Trap

Freeze dryers

Substrate Electrophoresis apparatus  
Blotting device for hybridization

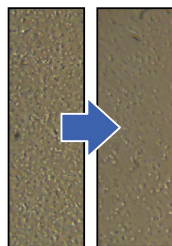
Constant-temperature water circulating system [Chilled]

Appendix

# 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)



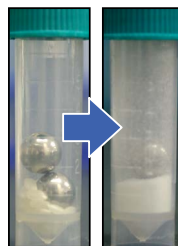
Beads: Zirconia beads  $\phi$ 0.2 mm  
Tube: 2 mL Screw cap microtube  
3200 r/min, 180 s



**Microtube holders for use**  
Versatile, high capacity holder. 1.5/2 mL Screw cap microtubes  $\times$  6

TH-0206

### ③ 1 g raw rice, crushing without Buffer



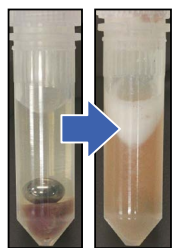
Beads: SUS beads  $\phi$ 10 mm  $\times$  2  
Tube: 5 mL Screw cap freestanding tube  
No solvent. 2000 r/min, 1 min



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

TH-0501

### ② Pig myocardium 100 mg



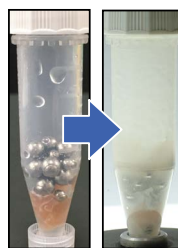
Beads: SUS beads  $\phi$ 5 mm  $\times$  1  
Tube: 2 mL Screw cap microtube  
Solvent 1 mL, 3200 r/min, 30 s



**Microtube holders for use**  
For heat-sensitive samples, pre-cooling the holder in a freezer (up to  $-20^{\circ}\text{C}$ ) before use is recommended. 1.5/2.0 mL  $\times$  3

TH-0203

### ④ 1 g pig belly, crushing with Buffer



Beads: SUS beads  $\phi$ 5 mm  $\times$  8 +  $\phi$ 3 mm  $\times$  10  
Tube: Eppendorf 5 mL Screw cap tube  
Solvent 500  $\mu\text{L}$ , 2000 r/min, 1 min

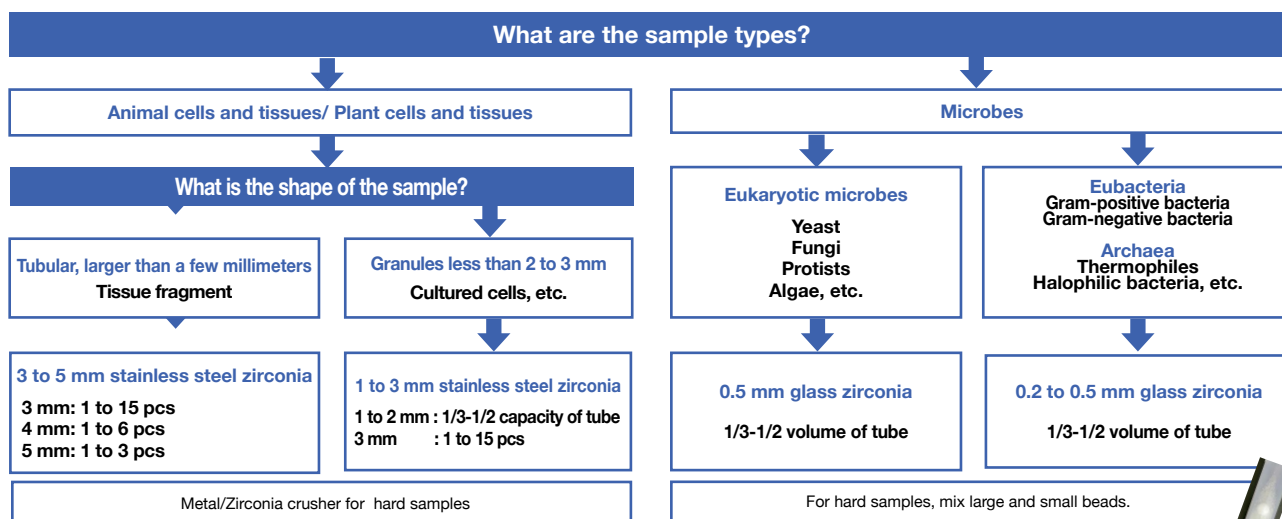


**Microtube holders for use**  
Eppendorf 5 mL Screw cap tube and this holder are recommended **if you want to crush a sample of about 1 g with solvent.**

TH-0501EP

## Selection of Beads and Microtubes for Bead Crushing

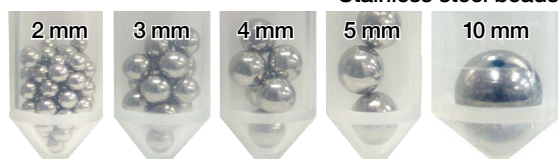
### Bead Selection Criteria



Metal/Zirconia crusher for hard samples

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 $\mu$ T-12

### Data on the heat generation of samples when crushing in $\mu$ T-12

In Crushing of samples with beads in  $\mu$ T-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	
<b>2.0 mL Screw cap Microtube</b>	$\phi$ 3 mm zirconia $\times$ 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.5°C</b>	6 pcs-holder	<b>+27.8°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+22.5°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+16.3°C</b>
	$\phi$ 3 mm stainless steel $\times$ 15 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.5°C</b>	6 pcs-holder	<b>+25.8°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+23.2°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+17.0°C</b>
	$\phi$ 5 mm stainless steel $\times$ 2 water 0.5 mL Shaking for 60 seconds at 3200 r/min	<b>+23.0°C</b>	6 pcs-holder	<b>+25.1°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+22.9°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+17.5°C</b>
	Metal crusher $\times$ 1 no solvent Shaking for 30 seconds at 2500 r/min	<b>+23.3°C</b>	6 pcs-holder	<b>+29.3°C</b>
			3 pcs-holder for cold storage (Pre-chilled at +4°C)	<b>+24.3°C</b>
			3 pcs-holder for cold storage (Pre-chilled at -10°C)	<b>+19.2°C</b>
<b>5.0 mL Screw cap Test tube</b>	$\phi$ 5 mm stainless steel $\times$ 15 water 2.0 mL Shaking for 60 seconds at 2500 r/min	<b>+23.3°C</b>	<b>+25.4°C</b>	

•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 pre-cooled 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

- 1 SARSTEDT made 72.693 for less than  $\phi$ 3 mm beads (Crushing of Bacteria and Yeast).
- 2 Scientific Specialties Inc. (US) made 2641-0B for  $\phi$ 4 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 $\phi$ 4 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  $\phi$ 5 mm Stainless steel beads and Metal crushers in  $\mu$ T-01/ $\mu$ T-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.

## $\mu$ T-12 About 5 mL recommended tubes



TH-0501

### Optional holders for $\mu$ T-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  $\times$   $\Phi$ 10 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.