CosmoSonic™ II Ultrasonic Cell Disruptor and Ice Cold Water Circulator Manual

CONTENTS

Attention:
This instrument is for
Research Use Only.

1) Safety precautions

For your protection, please read the following instructions completely and keep this manual for future reference. Carefully observe and comply with all cautions, safety warnings, and instructions described in this manual.

1. CosmoSonic™ II Ultrasonic Cell Disruptor (hereafter referred to as "CosmoSonic™ II") should only be used by qualified or trained personnel for its intended use.
2. Do not operate near flammable gases, liquids, or materials.
3. Do not operate the machine if it appears to be damaged or if a liquid or foreign object has entered the unit.
4. This unit is intended to be used only with the type of power source indicated on the serial / model plate.
5. In case of failure, do not attempt to repair the CosmoSonic™ II by yourself. Disconnect from power supply and contact Cosmo Bio USA or your local distributor.
6. When positioning the unit, ensure that there is no restriction to the power inlet. Special care should be taken not to obstruct the fan inlet at the rear of the unit. When fuses need to be replaced, make sure that you obtain fuses with identical characteristics as the original part (current, voltage, and type).

2) Operating Precautions

1. CosmoSonic™ II is intended to be used in connection with the dedicated ice cold water circulator (BMB-BR2CR01).
2. Pour water in disruption unit and never idle CosmoSonic™ II without water.
3. Maintain the amount of the water as indicated by water level marks on the inside of the disruption unit.
4. The standard intervals of ON/OFF are 30 seconds each.
5. Avoid the continuous running of CosmoSonic™ II over 15 min.
6. If you must run CosmoSonic™ II continuously over 15 min, stop it periodically to avoid increasing the temperature of the water or water bath. Increased water temperature can lead to mechanical and experimental failure.
7. Always dry the gear plates completely after use. They can be deformed or damaged by the damp.
8. The sonication is stopped for 5 seconds at the beginning of every irradiation cycle to stabilize the water surface of the disruption unit.

3) Setting Precautions

1) For your safety, please use straps and devices (known as the "fall prevention fixture") included to prevent overturning.
2) Keep a greater than 15 cm space clear in front of the sound absorbing box. If you cannot keep the space clear, please do not use the moving tray.
3) Use the included adjunctive connecting tube to connect the ice cold water circulator and CosmoSonic™ II as other tubes can result in leaks at the connection points. Use the included adjunctive tube cutter to cut the tube.
4) The heat indicator on the operation panel of ice cold water circulator is battery-powered. The operating time of the battery is approximately 5 years. Please follow the instructions in the attached appendix to replace the battery.

5) Features

1. The CosmoSonic™ II is a hermetically sealed unit that can be tested free of biohazards, contaminations, and radioisotopes.
2. It promotes reproducible results for a small or large number of samples.
3. An integrated programmable timer allows for easy setup.
4. Includes a high-level sound absorbing box

6) Product components

1) The CosmoSonic™ II does NOT include the ice cold water circulator, gear plates, tube attachments, or resonant rod units.
2) It includes, as shown below: CosmoSonic™ II main unit, power cable, fall prevention fixture, output connection cable, cooling fan connection cable, cooling tube (long / short) x2, manual, and warranty.

<table>
<tr><td></td><td>Model</td><td>CosmoSonic™ II Ultrasonic Cell Disruptor TYPE24</td><td>CosmoSonic™ II Ultrasonic Cell Disruptor TYPE12</td><td>CosmoSonic™ II Ultrasonic Cell Disruptor TYPE6</td></tr>
<tr><td rowspan="11">CosmoSonic™ II Ultrasonic Cell Disruptor</td><td>Oscillation unit</td><td>For TYPE24
1 unit</td><td>For TYPE12
1 unit</td><td>For TYPE6
1 unit</td></tr>
<tr><td>Disruption unit</td><td>For TYPE24
1 unit</td><td>For TYPE12
1 unit</td><td>For TYPE6
1 unit</td></tr>
<tr><td>Sound Absorbing Box</td><td colspan="3" rowspan="5">1 pc of each</td></tr>
<tr><td>Fall prevention fixture
(3 pcs, screw 6 pcs)</td></tr>
<tr><td>Power cable</td></tr>
<tr><td>Disruption unit connecting cable (5 pins)</td></tr>
<tr><td>Sound absorbing box connecting cable (2 pins)</td></tr>
<tr><td>Circulation water tube (long)</td><td colspan="3">2 pcs</td></tr>
<tr><td>Circulation water tube (short)</td><td colspan="3">2 pcs</td></tr>
<tr><td>Deck lid</td><td>For TYPE24
1 pc</td><td>For TYPE12
1 pc</td><td>For TYPE6
1 pc</td></tr>
<tr><td>Manual</td><td colspan="3">Common 1 pc</td></tr>
<tr><td></td><td>Power cable</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Ice Cold Water Circulator	Circulator connecting cable (3 pins)(3m)	-	-	-
	Connecting tube (1 roll, 12 m)	-	-	-
	L-shape connector (4 pc)			
	Tube cutter	-	-	-
	Spanner for removing tubes (1 pc)	-	-	-

Pictures of components included with CosmoSonic™ II

Power cable

Fall Prevention Fixture

Sound absorbing box connecting cable (2 pins)

Disruption unit connecting cable (5 pins)

Circulation water tube (Long: 2 pcs, Short: 2pcs)

Deck lid (Left: Type 6; Right: Type 12; Bottom Center: Type 24)

Pictures of components included with the Ice Cold Water Circulator

Power cable

L-shape connector

Tube cutter

Connecting tube

Circulator connecting cable (3 pins)

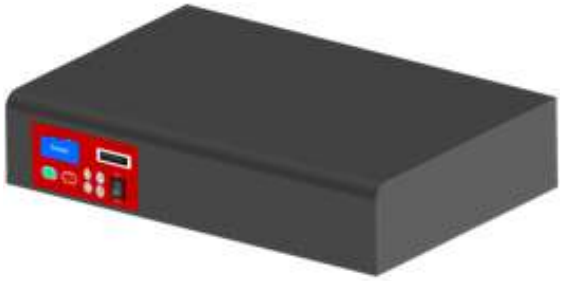
Spanner for tube unhitch

3) Unpacking

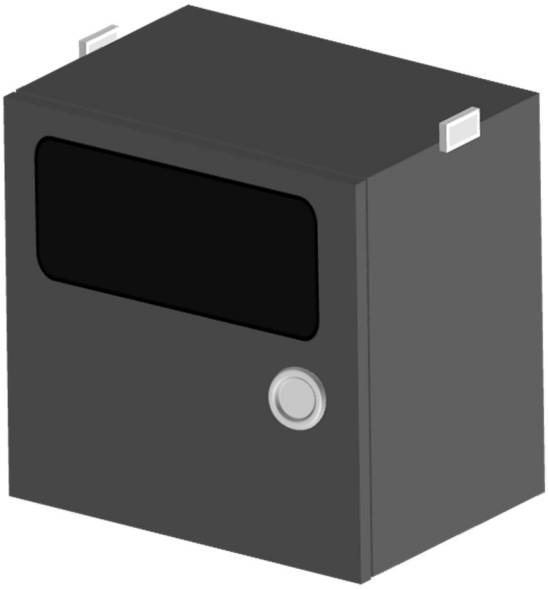
Before unpacking, please make sure that the outer packing of the CosmoSonic™ II is undamaged. After unpacking, ensure all packaging and fixtures are retained, as the unit should always be transported in the original packing to avoid damage. Cosmo Bio USA cannot be responsible for any damage incurred during incorrect packing and relocation of the unit.

If you encounter any difficulties unpacking or installing the CosmoSonic™ II, please contact Cosmo Bio USA or your distributor.

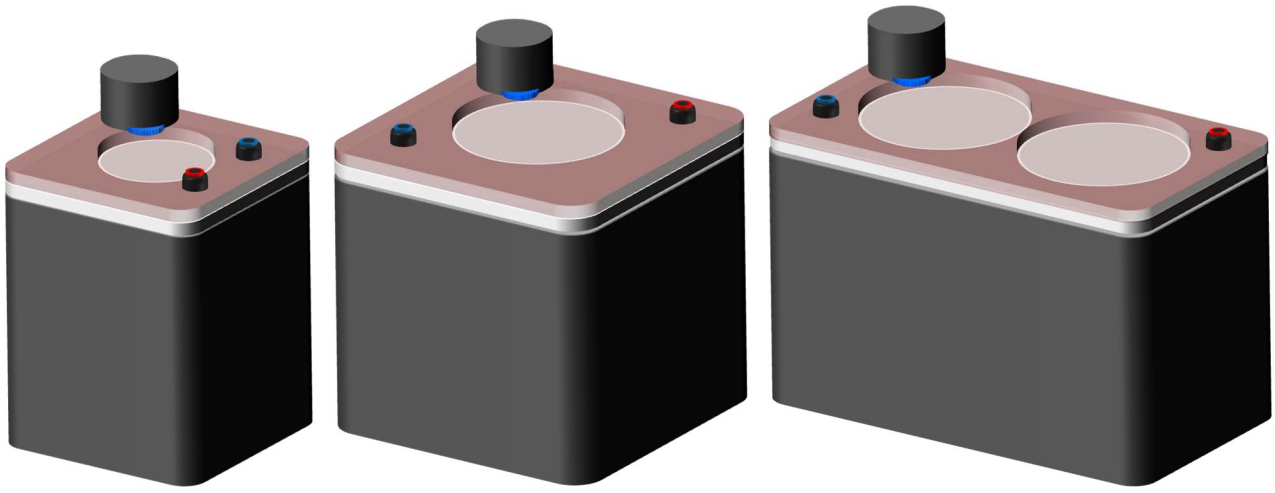
4) Description of main units



Oscillation unit



Sound Absorbing Box



Disruption Unit
TYPE6

Disruption Unit
TYPE12

Disruption Unit
TYPE24

5) Installation

1. Install the oscillation unit onto the sound absorbing box.
   The oscillation unit and the sound absorbing box should be fixed by attached clasps on the side.



2. Attach the ice cold water tube to the motor part of the deck lid.
   Connect shorter tube to inside and connect longer tube to outside.


Deck lid

Short tube

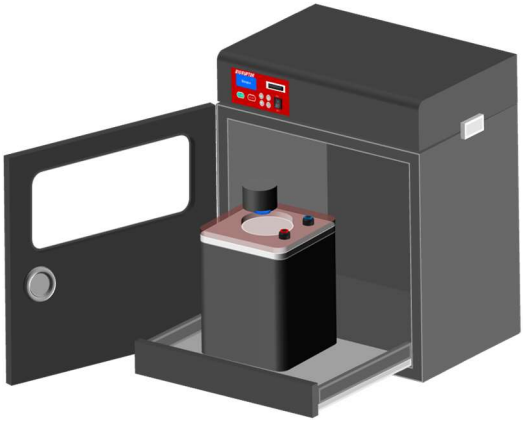
Long tube

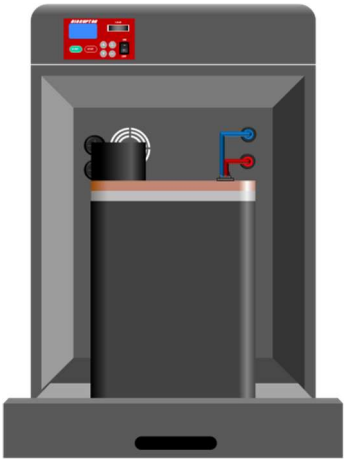
How to connect the tubes to connector	How to detach the tubes from the connector
Insert the tubes to connector firmly	Use the included adjunctive spanner, or something similar, to detach the tubes by pushing the tube ring.
	 

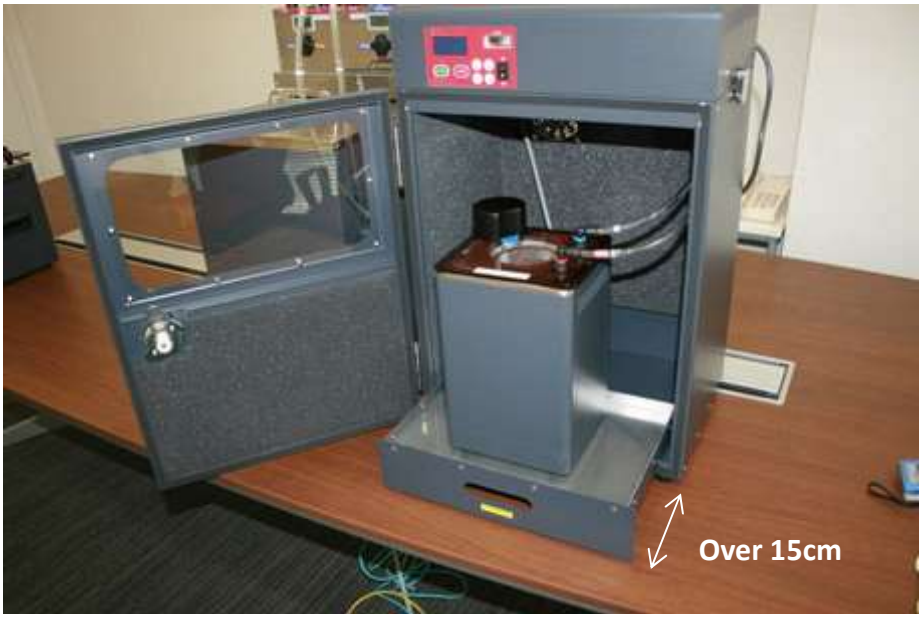
*

Put the lid on the oscillation unit. Connect motor cable to end terminal on back side of the oscillation unit.

3. Install the disruption unit on the moving tray in the sound absorbing box







*Keep **at least 15 cm space clear in front of the sound absorbing box**. If you cannot keep the space clear, do not use the moving tray.

* The circulating water tube is connected to the connector inside the sound absorbing box.

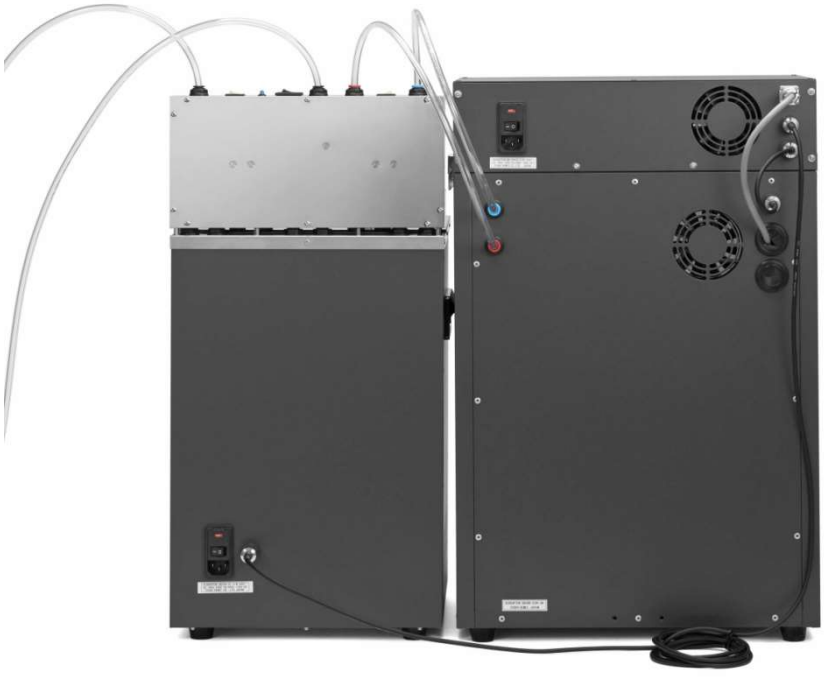
* For your safety, please use included fall prevention fixtures.

6) Interconnection and ductwork

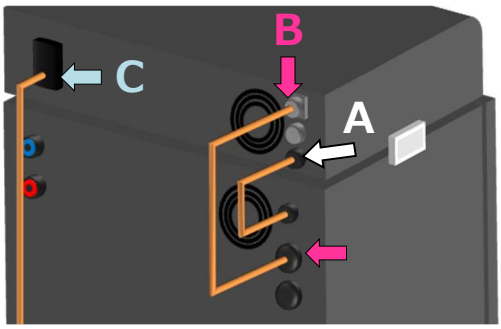
Installation image

Front view

Back view



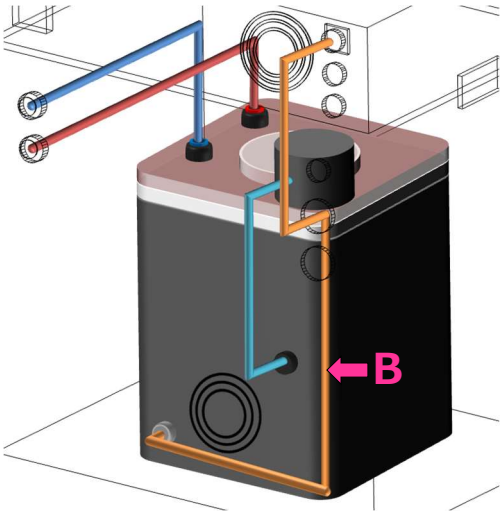
1) Connecting the oscillation unit, sound absorbing box, and disruption unit.



1. Terminal A is for connecting the cooling fan of sound absorbing box. Connect to cooling fan cable (2 pins). The other end of the cable (2 pins) is connected to the sound absorbing box terminal.

2. Terminal B is for connecting the oscillation unit. Attach the output connecting cable (5 pins). Conduct the other end of the cable through the hole on the back side of sound absorbing box. Connect the conducted cable in the box to the terminal on the back side of disruption unit.

3. Connect the power cable to oscillation unit (See "C").

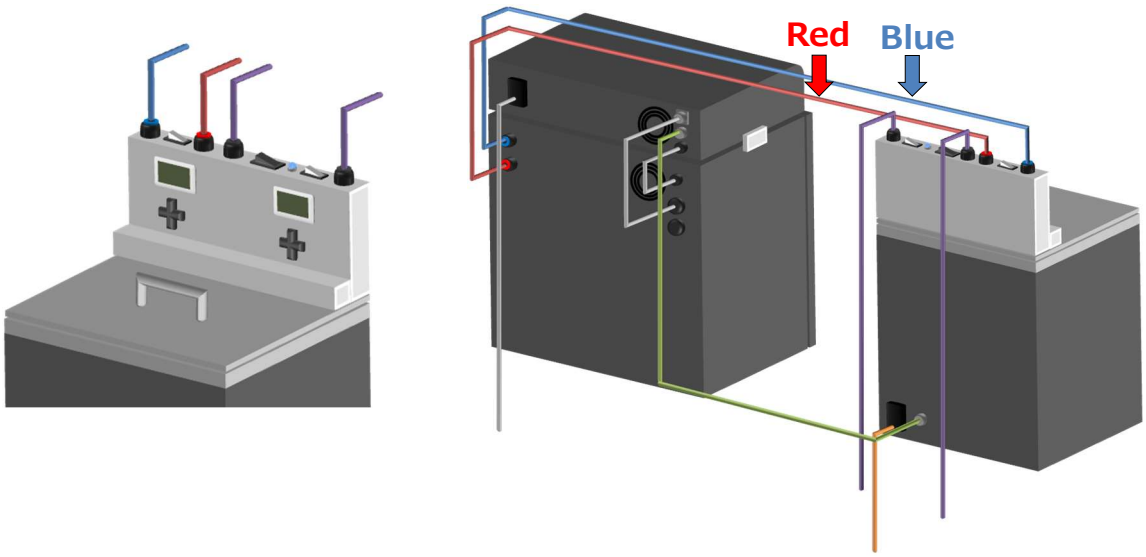


2) Connecting the CosmoSonic™ II to the ice cold water circulator

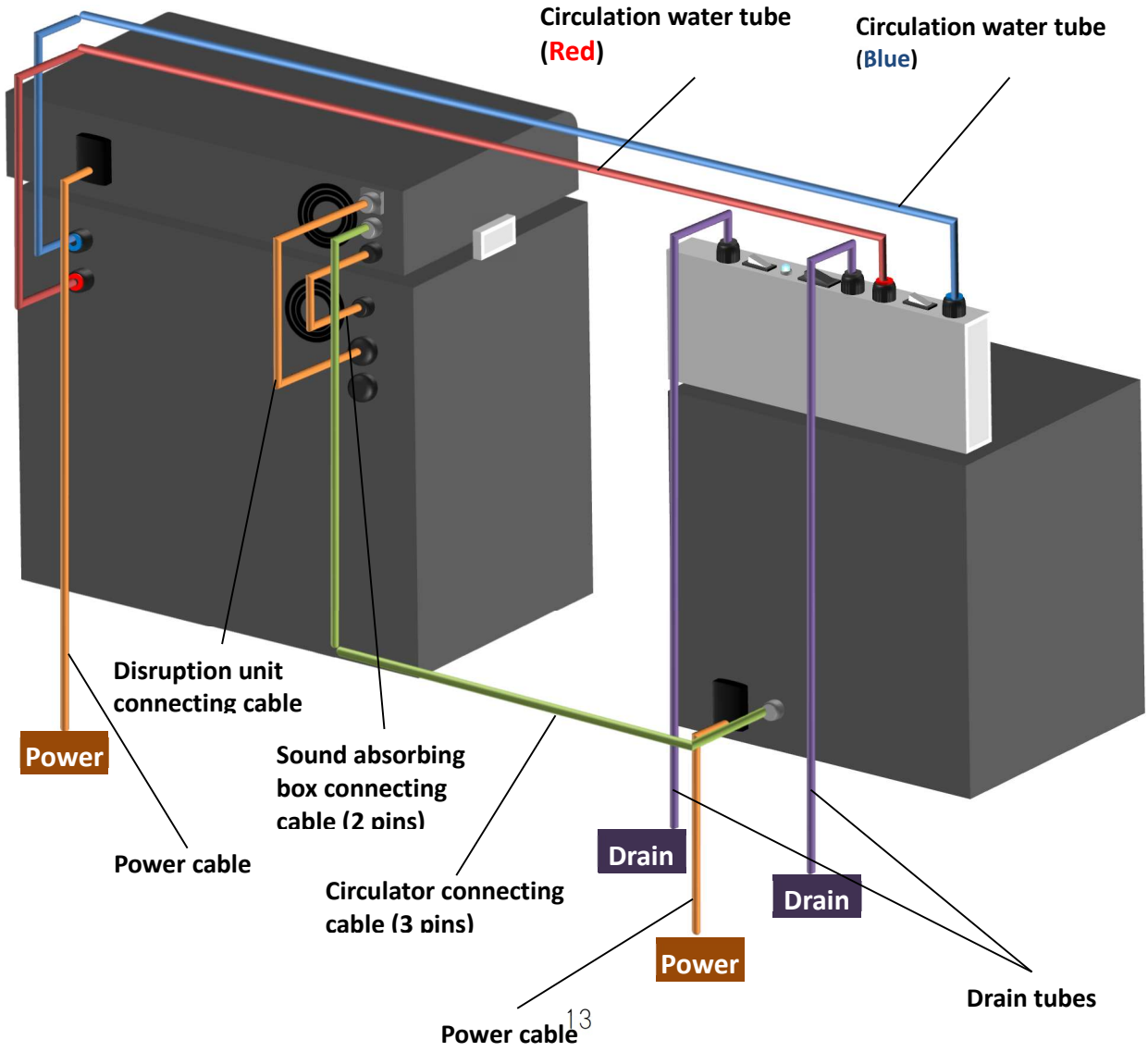
1. Connect tubes to 4 points of ice cold water circulation. Avoid leaks by connecting the tubes tightly.

2. Connect to CosmoSonic™ II by attaching the circulation water tube (Red) to both the red terminal of the oscillation and the red terminal of ice cold water circulator.

3. Connect the circulation water tube (Blue) to both the blue terminal of the Oscillation and the blue terminal of ice cold water circulation.



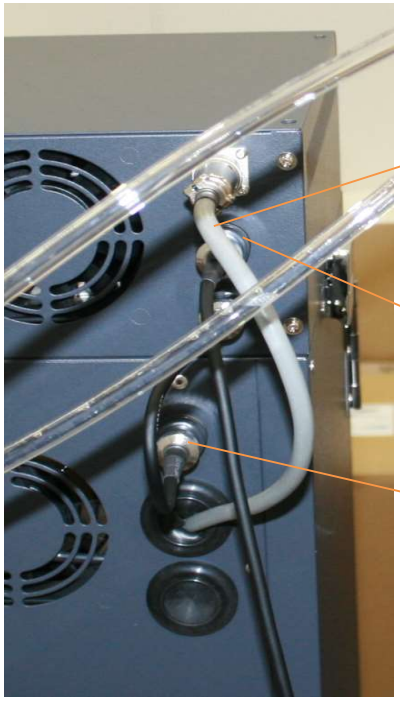
Back view showing connections



Power cable connector

Circulation water tube

Circulation water tube

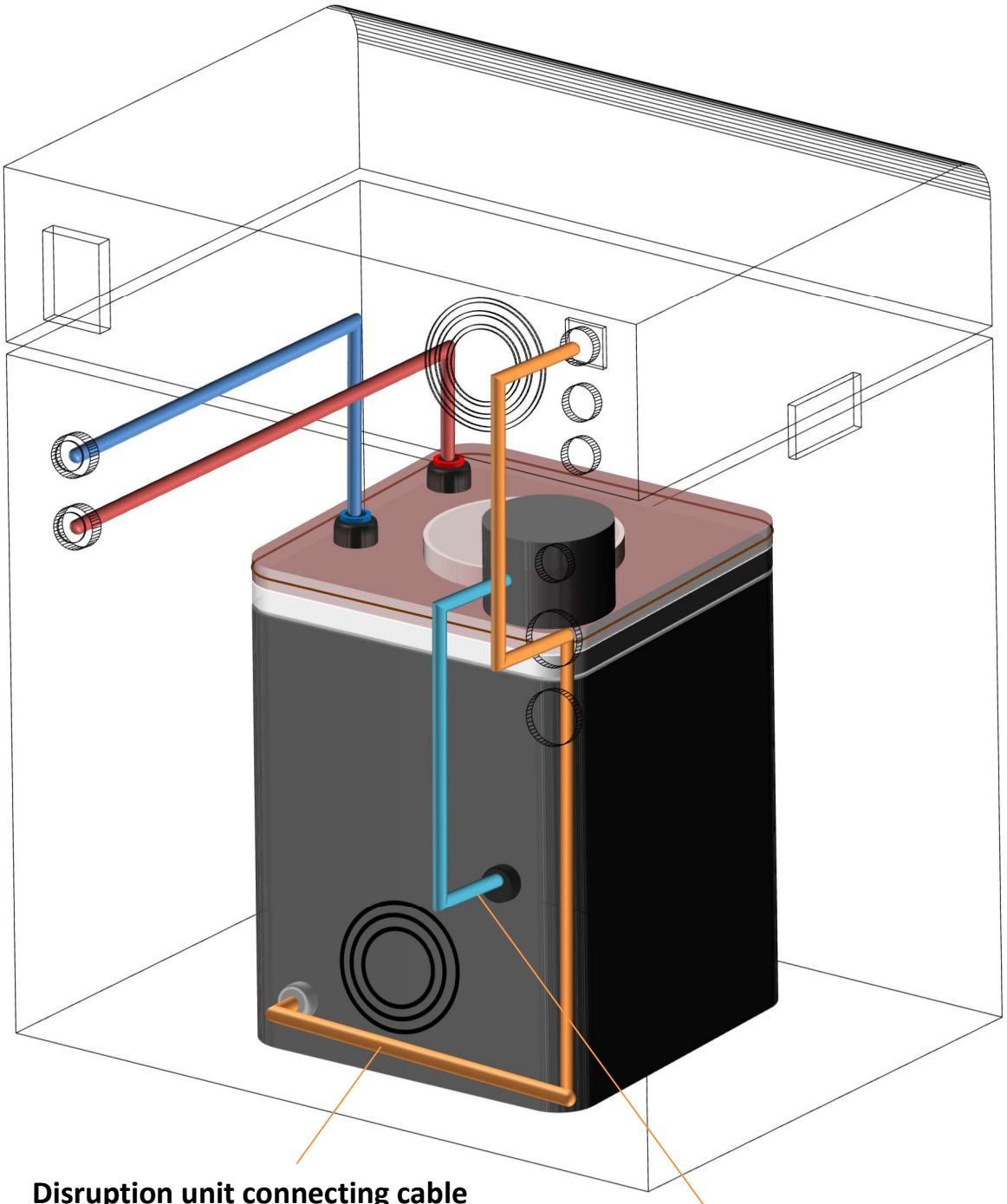


CosmoSonic™ II connecting cable

Circulator connecting cable (3 pins)

Sound absorbing box connecting cable (2 pins)

Disruption unit back view connecting image

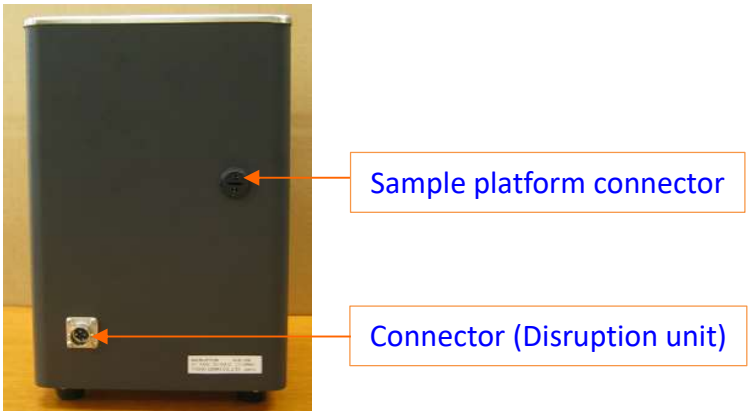


Disruption unit connecting cable

Disruption unit lid (motor part) connecting (2 pins)

9.1 Disruption unit components

1. Connector (Disruption unit): The connector to join the oscillation unit with a connecting cord.
2. Sample platform connector: To connect the sample platform motor.
3. Water level indicator: Fill water in processing tank of disruption unit. Do not overfill (use indication line as a guide)! To provide efficient sample cooling during processing, mix water with crushed ice. (Alternatively, use a ice cold water circulator.) Avoid adding too much ice because effective energy transfer of the supersonic wave to the sample may be disrupted. As a guideline, the thickness of the layer of crushed ice on the water surface should not exceed 1 cm.



Disruption unit

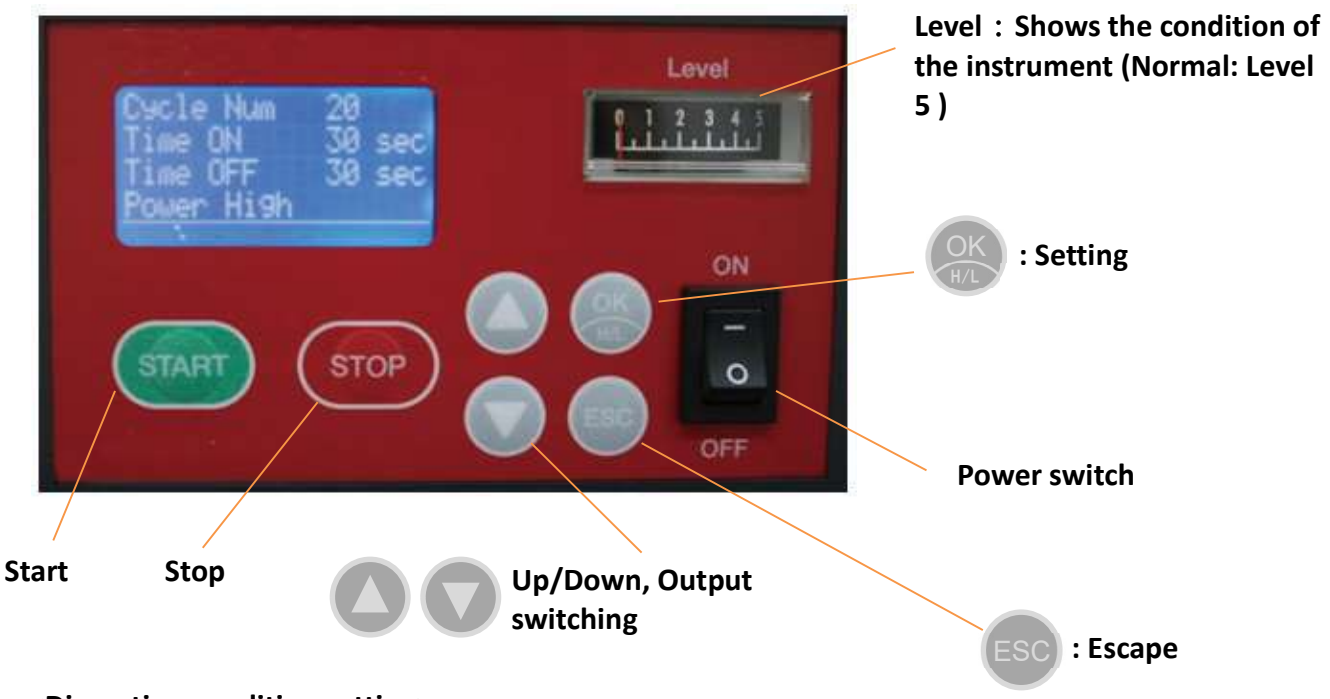
Disruption unit lid (motor part) 2 pins

Disruption unit connecting cable

7) System Configuration

10.1 Oscillation unit

1. Digital timer (Crouzet timer): The disrupting conditions are displayed. Set the disruption cycle and time. To avoid overheating of the oscillation unit, CosmoSonic™ II has an interval time with ON-time and OFF-time. The standard interval time is 30 sec.
2. Start button: The switch button to start disruption.
3. Stop button: This button is to stop disruption. The settings are reset by pushing this button.
4. Up/Down switch: These switches can be used for number settings or output level.
5. OK (H/L) button: Mode setting
6. ESC button: Escape
7. Level meter: The condition of the instrument relating to the watt output level. The number a relative value. Basically, when the instrument is under normal condition, the meter indicates “5”. Normally, if you choose the output level is High, the indicator shows around 5, and if you select Low, it shows around 3 -4. If the indicator is not stable, it may need repair.
8. Power switch: The button to turn on and off the Oscillation unit.



<Disruption condition setting>

OK H/L : Shows modes by pushing
Cycle Num > Time ON > Time OFF > POWER SELECT

: Changes configuration

Modes

Cycle Num: Number of interval cycle
Time ON: Ongoing time of ultrasonic wave (Recommendation: 30 sec)
Time OFF: Stopping time of ultrasonic wave (Recommendation: 30 sec)

Power: Output

10.2 Sample Volume Optimization

Refer to the table below for recommended sample volumes for each tube. However, in addition to the sample volume, the disruption efficiency is strictly dependent on the nature of the biological sample to be processed, e.g., cell density, cell type, and cell state, as well as sample buffer composition. The optimal disruption conditions (including output power settings) for specific applications should be tested empirically.

Sonication Container	Recommended Sample Volume
0.5 ml micro - tube	100 ul
1.5 ml micro - tube	250 ul
10 ml tube	2 ml
15 ml tube	3 ml
50 ml tube	20 ml

***When the number of sample tubes is less than maximum tubes in a micro-tube unit holder, we recommend setting a dummy tube filled with water so that it can be equally irradiated with an ultrasonic wave.** Unoccupied sample spaces reduce the energy transfer efficiency of the supersonic waves in the tank.

10.3 Sample Handling

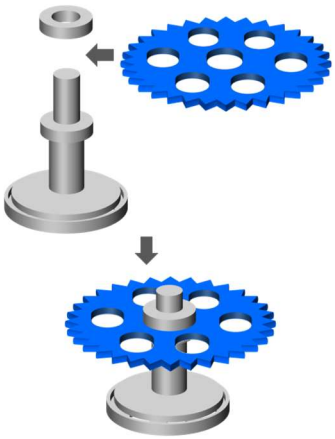
To avoid overheating of the sample(s), keep tube(s) on ice prior to use. Fill water tank of disruption unit with ice-cold water (add crushed ice as required). Add sample(s) to be processed into suitable tube(s) as described in 6.3 Place container(s) in base plate and insert assembly in disruption unit platform.

During sample processing, check the temperature distribution in the tank. Avoid overfilling of disruption unit water tank.

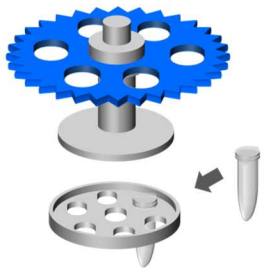
10.4 Container preparation

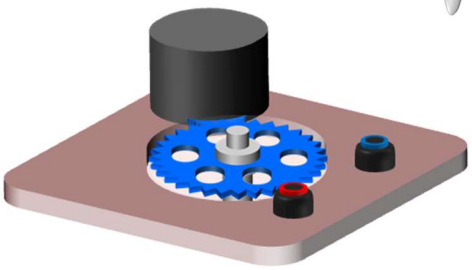
1. 0.5 mL micro-tube unit (BMB-MAT-05)

1. Before use, remove the upper screw on BMB-MAT-05, place gear plate (BMB-NG-6) on the bar, and tighten the upper screw to hold the gear plate in position.



2. Open the micro-tube holder of the lower BMB-MAT-05 part by turning counter - clockwise.
3. After filling the micro-tubes with sample, place micro-tubes in holder (occupy all 12 or 24 spaces) and close the assembly.
4. To guarantee homogeneity of chromatin shearing, the holder should always be completely filled. **Thin-walled 0.5 mL tubes specially adapted for thermal cyclers can be used for sonication but all new material should be tested with water-filled tubes in a typical sonication.** Once selected, stick to a particular brand of tubes for reproducibility of results.





2. 1.5 mL micro-tube unit (BMB-MAT-15)

1. Before use, remove the upper screw on BMB-MAT-15, place gear plate (BMB-NG-6) on the bar, and tighten the upper screw to hold the gear plate in position.


2. Open the micro-tube holder of the lower BMB-MAT-15 part by turning counter - clockwise.

3. After filling the micro-tubes with samples, place the micro-tubes in holder (occupy all 6 spaces), and close the assembly.

4. PLEASE NOTE: **2 mL micro-tubes should not be used with the CosmoSonic™ II**. All micro-tubes are generally made in polypropylene. Special micro-tubes in TPX plastic have a slightly better ultrasound transfer rate.


3. 10 ml (CHIP-10) resonance rod unit

1. Insert a resonance rod in the tube into the sample tube. Turn an upside small knob to the right, and the internal O ring will be extended and it will seal completely.

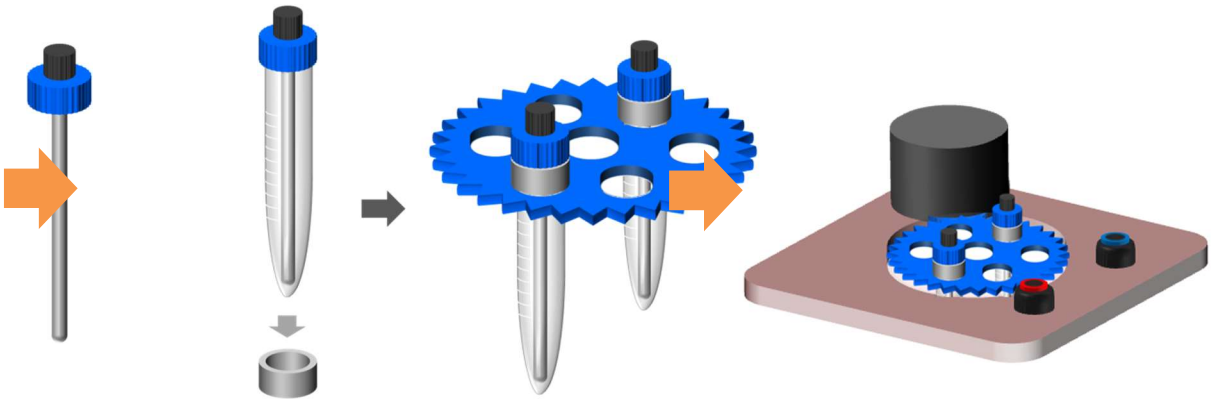
2. Set a gear plate on deck lid and insert a sample tube.
3. In case of BMB-NG-6, 6 samples can be set to one gear plate at once. When number of sample tubes is less than 6, please set a dummy if needed in order to maintain reproducibility.

4. 15 ml (BMB-FT-15WS, BMB-CT-15WS, BMB-ST-15WS) tubes



1 2 3

1. BMB-CT-15WS: 15 ml Tube Unit for Corning/Iwaki
2. BMB-FT-15WS: 15 ml Tube Unit for Falcon/Greiner
3. BMB-ST-15WS: 15 ml Tube Unit for SMILON



1. A resonance rod unit is inserted in the tube of the sample and the screw cap is turned to the right, closing.

2. By turning the upside small knob to the right, the internal O ring will be extended, and the tube will be sealed completely.

3. Set the gear plate on Deck lid and insert a sample tube using the attached aluminum ring.

4. In the case of BMB-NG-6, 6 samples can be set in one gear plate at one time. When the number of sample tubes is less than 6, please set a dummy in order to maintain reproducibility.


5. **PLEASE NOTE: Screw cap pitches differ depend on the manufacturer of the tube. Please use a proper resonance rod unit**. When an un-proper chip is used it may not be able to seal tightly

2 50 ml (BMB-CT-50WS, BMB-FT-50WS, BMB-ST-50WS, BMB-CHIP-50) tubes

1 2 3 4

1. BMB-CT-50WS: 50 ml Tube Unit for Corning/Iwaki
2. BMB-CFT-50WS: 50 ml Tube Unit for Falcon/Greiner
3. BMB-ST-50WS: 50 ml Tube Unit for SMILON
4. BMB-CHIP-50: 50mL Tube Unit for Nalgene

1. A resonance rod unit is inserted in the sample tube, and the screw cap is turned to the right, closing the lid.
2. By turning the upside small knob to the right, internal O ring will be extended, and the tube will be sealed completely.
3. Set a gear plate on the deck lid and insert the sample tube
4. In case of BMB-NG-50-3, 3 samples can be set to one gear plate at once. When the number of sample tubes is less than 3, set a dummy in order to maintain reproducibility.

Picture of NG-50-3

6. **PLEASE NOTE: Screw cap pitches differ depend on the manufacturer of the tube. Please use a proper resonance rod unit**. When an un-proper chip is used it may not be able to seal tightly

8) Operation

1. **Disruption unit water**: To provide efficient sample cooling during processing, use water mixed with crushed ice in the disruption unit. (Alternatively, use the ice cold water circulator) Avoid adding too much ice as effective energy transfer of the supersonic wave to the sample may be disrupted. As a guideline, the thickness of the layer of crushed ice on the water surface should not exceed 1 cm.
   Do not turn on the machine without water. Watch the water level-deviation from the water line may cause damage.
2. **Cycle Number**: Set the repeat number of the sonication ON and OFF cycle.
3. **Time On**: Set the sonication time per one cycle. The standard time is 30 sec, and the maximum time is 99 sec.
4. **Time Off**: Set the sonication OFF time per one cycle. The minimal setup time is 30 sec, and the maximum time is 99 sec.
5. **Output power selector**: There are two power settings, “High” or “Low”, for the sonication process. Set the power with the intended use. Do not change the setting on running.
6. **Container unit**: Install the Container unit containing tubes with samples to the Sample platform
7. **START**: Push START button to run.

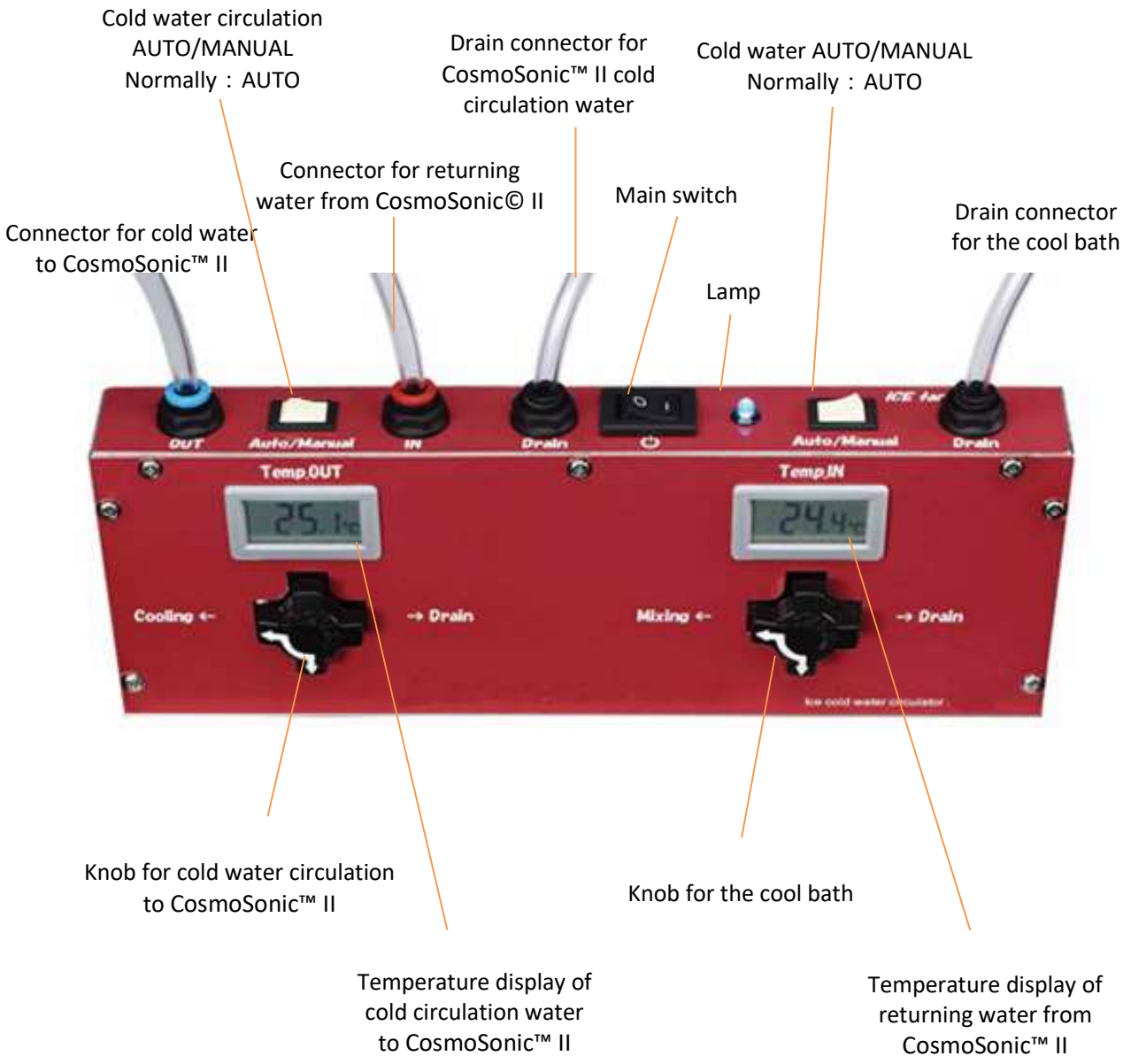
9) Exit operation

After running is finished, push Power Switch to OFF. If it is not used for long time, disconnect the power plug. Drain the disruption unit (see page 27, “Draining Water”)

Do not store nylon gear plates in the water or humid condition. Gear plates should be stored dry.

10) Cold Water Circulation System

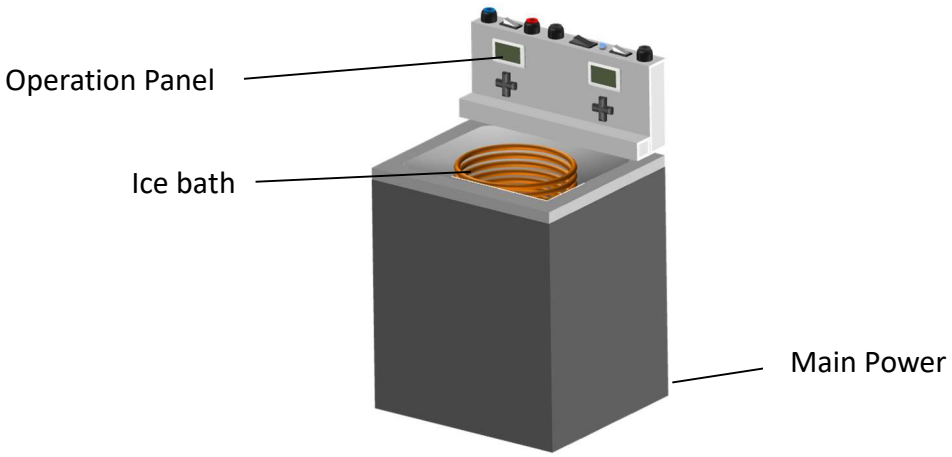
13.1 Explanation of the system panel

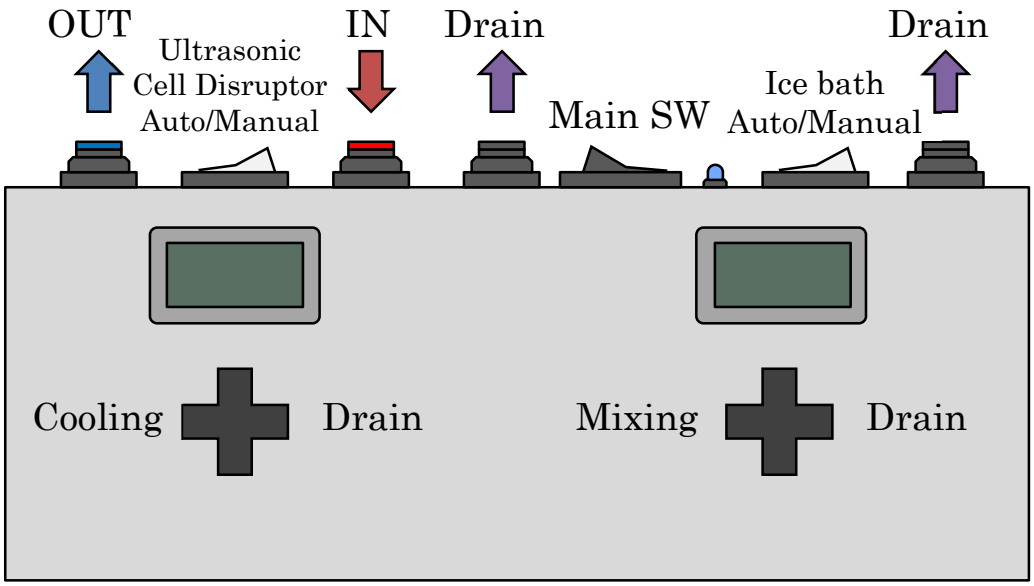


13.2 Operating

1. This instrument is to be used with CosmoSonic™ II.
2. Put ice and water into the ice bath.
3. Set the direction of knobs to “Cooling / Mixing”
4. Set the changing-over switch for CosmoSonic™ II and Ice bath to “Auto”.
5. Set the Main switch on. The ice bath will begin churning.
6. After the CosmoSonic™ II powers up, the circulation of cool water will be started.
7. Check the water level of disruption unit and adjust the level if needed.
8. The cold water circulation stops during irradiation of ultrasonic wave.
9. When the irradiation stops, the water circulation to CosmoSonic™ II will turn back on.
10. When the CosmoSonic™ II is stopped, water circulation will be on and keep the samples at a cool temperature.

※ Setting to ice bath churn switch to “Manual” enable all time churn.





13.3 Draining water

1. Turn the main switch off.
2. Turn the Cosmosonic™ II cold water circulation switch (left side) to "Manual".
3. Switch the valve for cold water circulation to Cosmosonic™ II (left side) to "Drain".
4. Put the end of the tube for cold water to Cosmosonic™ II (left side, blue) to a liquid container.
5. Turn the main switch on. You can drain water from the disruption unit.
6. Then turn the main switch off again.
7. Turn the ice bath switch (right side) to "Manual".
8. Switch the valve for the Ice bath (right side) to "Drain".
9. Put the tip of the tube for the Ice bath (right side) to a liquid container.
10. Turn the Main switch on. You can drain water from the ice bath.
11. Remove stains with cloth.

11) Specifications

Description		CosmoSonic™ II Ultrasonic Cell Disruptor (TYPE6)	CosmoSonic™ II Ultrasonic Cell Disruptor (TYPE12)	CosmoSonic™ II Ultrasonic Cell Disruptor (TYPE24)
Model (Cat. No.)		BMB-BR2006A	BMB-BR2012A	BMB-BR2024A
Ultrasonic wave irradiation		Bathtub		
Ultrasonic Wave Frequency		20 KHz		
Size	Oscillation unit	400 (W) ×280 (D) ×100 (H) mm		
	Disruption unit	175(W)×160(D)×280(H) mm	240(W)×210(D)×280(H) mm	320(W)×180(D)×280(H) mm
	Sound Absorbing Box	400 (W) ×300 (D) ×520 (H) mm		
Minimum installation space		400 (W) ×300 (D) ×620 (H) mm		
Weight		~24 kg	~27 kg	~28 kg
Electric source		AC 100-240 V, 50/60 Hz, 5.5 A		
Run cycle (Cycle number)		1 - 60 times		
Interval timer (ON)		1 - 99 sec. digital		
Interval timer (OFF)		30 - 99 sec. digital		
Ultrasonic wave output power		High or Low		
Attachments		None (purchase separately)		
Number of samples to be processed simultaneously		12 tubes (0.5ml) 6 tubes (1.5ml,10ml,15ml) 3 tubes (50ml)	24 tubes (0.5ml) 12 tubes (1.5ml,10ml,15ml) 6 tubes (50ml)	48 tubes (0.5ml) 24 tubes (1.5ml,10ml,15ml) 12 tubes (50ml)
Packaging size		540 (W) ×495 (D) ×395 (H) mm 610 (W) ×485 (D) ×450 (H) mm (Sound Absorbing Box)		
Packaging weight		~17 kg / ~15 kg (Sound Absorbing Box)	~20 kg / ~15 kg (Sound Absorbing Box)	~21 kg / ~15 kg (Sound Absorbing Box)

Description	Ice cold water circulator
Model (Cat. No.)	BMB-BR2CR01
Size	300 (W) ×300 (D) ×620 (H) mm
Weight	~16 kg
Electric source	AC 100-240 V, 50/60 Hz, 5.5 A
power consumption	25 W
Tank Capacity	14 L
Circulation Pumping rate	1.56 L/min
Mixing Pumping rate	1.40 L/min
Attachments	Connecting tube / Circulator connecting cable (3 pins) / L-shape connector / Tube cutter / Spanner for tube unhitch
Packaging size	715 (W) ×410 (D) ×420 (H) mm
Packaging weight	~20 kg

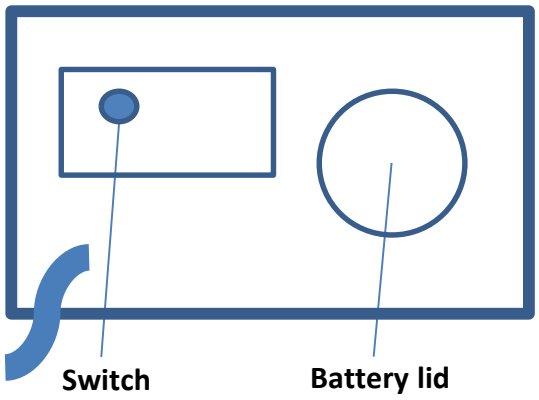
12) Warranty

Cosmo Bio USA, Inc. guarantees the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator you have received have been thoroughly tested and meets its published specification. Cosmo Bio USA, Inc. warrants the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator against defects in materials and workmanship for 12 months after purchase. If any defects occur in the instrument during this period, Cosmo Bio USA, Inc. will, at our discretion, repair or replace the defective part(s) free of charge or refund the purchase price. However, no liability is accepted for loss or damage arising from the incorrect use of the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator. In such a scenario, Cosmo Bio USA, Inc. is not liable for any consequential damages. Cosmo Bio USA, Inc. reserves the right to alter the specification of the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator without prior notice. This will enable us to implement developments as soon as they arise. The CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator are for research use only. Carefully read the instruction manual before installation, use, and service of the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator to guard against injury and damage, and to ensure highest disruption efficiency. If the CosmoSonic™ II Ultrasonic Cell Disruptor and Cold Water Circulator are not used as specified in this manual, the user's protection provided by the safety features of the equipment may be impaired.

Appendix 1: Battery exchange method

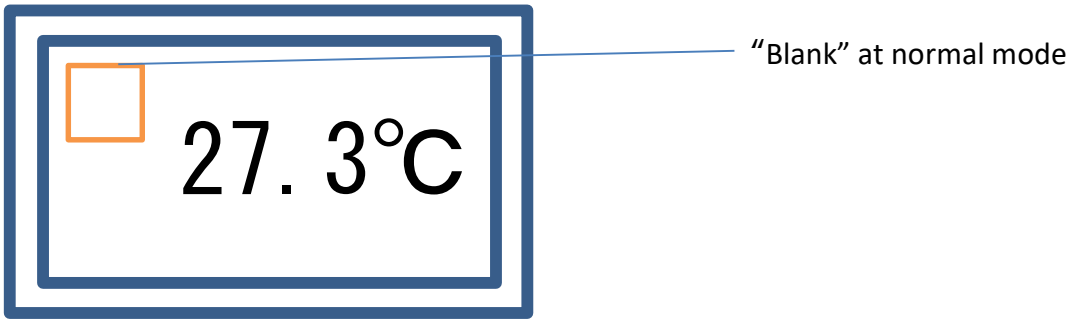
Remove 7 screws on the front panel of ice cold water circulator.
Remove the front panel and check the back side of temperature indicator.

<Back side of temperature indicator >



Remove the lid of battery and replace the batteries. The battery type is LR44

After changing the battery, please hold down the switch for 3 seconds to “ON”.
Confirm the mode setting.
Change the mode by pushing the switch quickly, “Normal mode” and ”MAX/MIN”.



Attach the front panel to original position.