

## FreezeBox无冰冰盒 使用说明书

### 一、无冰冰盒概况

无冰冰盒是一种台式的新型的节能，环保，安全，标准化无添加物的冷冻装置，它在无电，无冰的情况下也能为生物样品带来全天候的低温保护。

冰芯的铝合金外壳协同高导热的合金模块，确保样品能快速冷却，孔之间的温度差异小于0.1℃，能很好的维持样品间的温度一致性。

无冰冰盒轻巧，携带方便，非常适合生物样品的采集，协助保存最不稳定的核酸样品。其小巧的设计盒无冰的技术让无冰冰盒也很适合组织培养箱，生物安全柜以及其他空间有限的情况。

无冰冰盒可选择不同的冰芯和多种导热的试管模块，适用于不同的样品盒温度。

### 二、无冰冰盒特点

- 1、能为生物样品带来全天候的低温保护；
- 2、各孔位间温度高度的一致性，保证样品试验结果一致性；
- 3、可选不同的冰芯，用于不同的保存温度；
- 4、可选不同的导热模块，用于不同的试管；
- 5、轻巧，携带方便，非常适合生物样品的采集；
- 6、易于清洁及消毒；
- 7、高度耐用，适用于频繁和反复使用。

### 三、无冰冰盒使用方法

通过一些暗盒和冷却方案的选择，样品可以保持在-78℃到4℃的温度区间范围内

温度范围	制冷源	冷藏时间（开盖）	冷藏时间（合盖）
0.5℃~4℃	Cl冰芯	4小时以上	10小时以上
-18℃~-4℃	Cf冰芯	3小时以上	6小时以上
-30℃~-20℃	干冰（带隔热垫）	5小时以上	6小时以上
-78℃	干冰	5小时以上	6小时以上

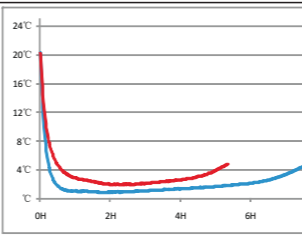
注 1: 当开盖使用时，隔热垫可以保护暴露在空气中的模块表面不受环境热量的影响，以提供更佳的冷藏时间，也可将隔热垫放置在干冰和模块之间，保持中低温状态。隔热垫为选购件。

2: 实际性能可能根据环境温度、启动参数、样品负载、初始样品温度、气流、辐射能源和其他条件的差异而变化。

#### 1、0.5℃~4℃（Cl冰芯）

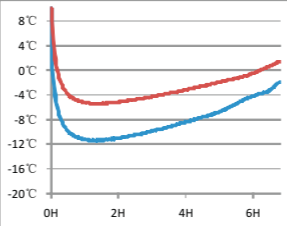
把Cl冰芯放在-20℃冰箱里冷冻至少4小时，把模块在0~4℃的冰箱中预冷约30分钟。从冰箱中取出Cl冰芯，并放置在室温下10分钟。把Cl冰芯放置在无冰冰盒底部，然后放上模块。模块的温度应该在0.5℃~4℃范围中保持平衡。把盖子合上可以延长冷藏时间；用隔热垫可以延长冰芯保养周期或者在更高的环境温度条件下操作。

注：冰芯和模块的处理也可采取不同的处理方式，如下图所示

温度范围	制冷源	制冷源处理	模块处理	保温时间(开盖)	保温时间(合盖)	保温时间示意图
0.5℃~4℃	冰芯Cl	在-20℃放置4小时以上 回温10分钟后使用	预冷至0.5℃~4℃	4h	6h	
		在-20℃放置4小时以上 直接使用	室温			
		在-80℃放置2小时以上 直接使用				

#### 2、-18℃~-4℃（Cf冰芯）

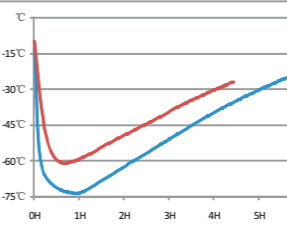
把Cf冰芯放在-20℃冰箱里冷冻至少6小时，把模块在-20℃的冰箱中预冷约30分钟。把Cf冰芯放置在无冰冰盒底部，然后放上模块。把盖子合上可以延长冷藏时间；用隔热垫可以延长冰芯保养周期或者在更高的环境温度条件下操作。

温度范围	制冷源	制冷源处理	模块处理	保温时间(开盖)	保温时间(合盖)	保温时间示意图
-18℃~4℃	冰芯Cf	在-20℃放置6小时以上	在-20℃冰箱预冷30分钟	3h	4h	
		在-80℃放置3小时以上				

#### 3、-78℃~-20℃（碎干冰）

用手指抓住无冰冰盒底部，盒子凹槽里装满粉碎的干冰（约200g）。把隔热垫放在干冰上面。把模块放在隔热垫的上面。当干冰升华后，模块的温度将会很快平衡至-20℃，然后缓慢降至-30℃。把模块直接放在干冰上面（不加隔热垫），模块的温度将会很快达到干冰的温度（-78℃左右）。盖上冷藏盒的盖子，将不会进一步降低模块的温度，但是可以延长冷藏时间。

注：具体的数据，如下图所示：

温度范围	制冷源	制冷源处理	模块处理	保温时间(开盖)	保温时间(合盖)	保温时间示意图
-78℃~30℃	碎干冰	约200g 直接放入盒底	直接放室温模块	4h	5h	

### 四、其他

#### 1、保养与清洁

无冰冰盒可长时间暴露在低温下,可通过水和肥皂清洗。可以耐酒精和10%浓度的漂白剂。避免磨蚀性或尖锐的物体。不要用无冰冰盒来粉碎干冰。不要 高压处理无冰冰盒。最高可暴露在60℃的温度中。应避免暴露于紫外线光源。无冰冰盒不建议运输温度敏感的样品。

#### 2、测试设备

用体积较小的温度探头，如电偶探头

用数字温度计来匹配探头

有代表性的封闭样品试管帽

#### 3、测试程序

在样品的试管帽中间钻一个圆形的中央小孔，可使温度

探头线进入，使最小的环境空气流入

样品试管装满1ml的水

把样品试管盖上试管帽，插入温度探头

把待试验的样品试管放在模块的任意一个孔中

通过和任意一个孔中的直接接触，温度能够被测量出来

注意：这里介绍的产品是给受过培训和经验丰富的实验室和医务人员专用。所描述的方法部分需要使用干冰。皮肤直接触碰干冰或者碰触和干冰接触过的金属部件可引起冻害。拿干冰和冷金属部件时，必须使用对眼睛、皮肤适当的防护设备。

# FreezeBox Instructions for use

## Overview

Ice-free Freeze box is a new type of energy-saving, environmentally friendly, safer, and standardized with no additives, cooling equipment. It uses no electricity, no ice and brings low temperature protection for biological samples.

Ice core aluminum alloy shell with high thermal conductivity of the alloy module to ensure that the sample can be quickly cooled, the temperature difference between the sample holes less than 0.1°C, it can maintain a uniform temperature between the samples.

The Freeze box is Ice-free, lightweight, easy to carry, ideal for collection of biological samples, it also can be used in helping to preserve the unstable nucleic acid samples. Its compact design and ice-free technology make it ideal for tissue culture incubator, bio-safety cabinet and any other application with limited space.

The freeze box can choose with different ice core, and a variety of thermal test tube modules for usage in different samples and temperatures.

## Product Features

1. Can bring low temperature protection for biological samples all mes;
2. The uniformity of the temperature between the holes can ensure consistency of the sample test results;
3. Optional different ice cores selection for different storage temperatures;
4. Applicable to a variety of thermal pipes and modules;
5. Easy to clean and disinfect;
6. Lightweight, easy to carry, suitable for the collection of biological samples;
7. Highly durable, suitable for frequent and repeated use.

## Use method

By selecting from a number of ice core and cooling options, samples can be maintained within a variety of temperature bands that range from -78°C to 4°C.

Temperature Range	Cooling Sources	Insulation Time (Open cover)	Insulation Time (Close cover)
0.5°C~4°C	Ice core CL	Over 4 hours	Over 10 hours
-18°C~-4°C	Ice core CF	Over 3 hours	Over 6 hours
-30°C~-20°C	Dry ice with heat shield	Over 5 hours	Over 6 hours
-78°C	Dry ice	Over 5 hours	Over 6 hours

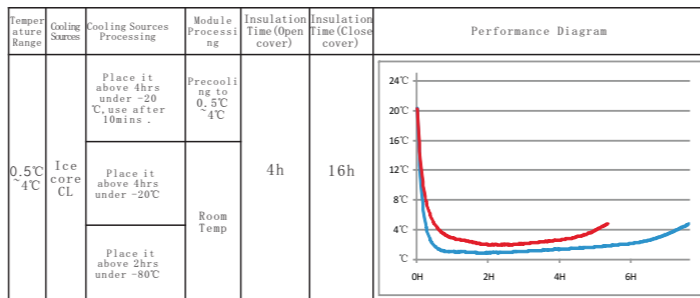
NOTE: Use of the heat shield (open cover) to protect exposed surface of Tube module from environmental heat influx will provide optimal cooling duration. The heat shield is the choice and buy.

Actual performance may vary depending upon ambient temperature, start-up parameters, sample load, initial sample temperature, air currents, radiant energy sources and other conditions.

### 1. 0.5°C~4°C (Ice core CL)

Freeze ice core CL in a -20°C freezer for a minimum of four hours. Pre-chill the tube module to 0°C to 4°C in a refrigerator for approximately 30 minutes. Remove ice core from freezer and allow ice core to sit at room temperature approximately 10 minutes. Place a frozen ice core in the freezebox base followed by a tube module. The module temperature should equilibrate between 0.5°C to 4°C. Keep the lid on the freezebox to prolong the cooling duration; use heat shield to extend ice core service interval or conditions of higher environmental temperatures.

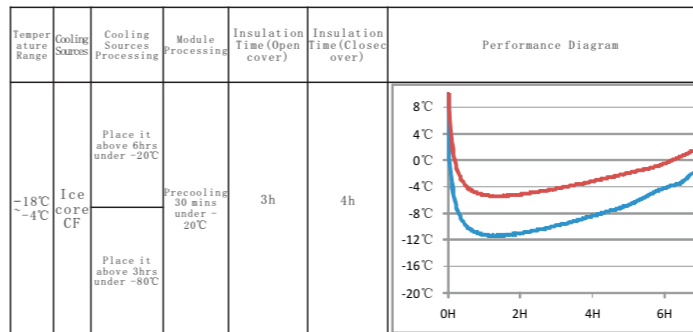
Note: Ice core and tube module of the processing can also didn't go to other way, as shown in the figure below



### 2. -18°C~-4°C (Ice core CL)

Freeze ice core CF in a -20°C freezer for a minimum of 6 hours. Pre-chill the tube module in the -20 freezer for approximately one-half hour. Place a frozen ice core in the freezebox followed by the pre-chilled tube module. Keep the lid on the freezebox to prolong the cooling duration; use heat shield to extend ice core service interval or conditions of higher environmental temperatures.

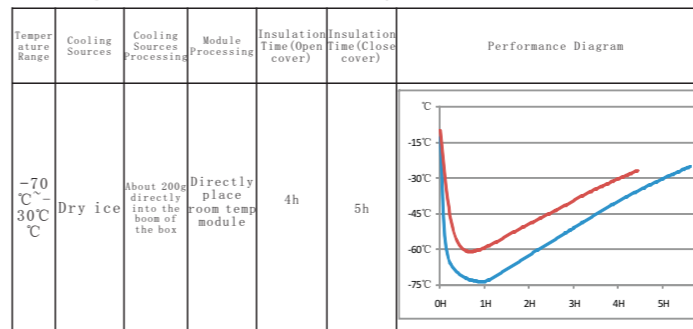
Note: Ice core and tube module of the processing can also didn't go to other way, as shown in the figure below



### 3. -78°C~-20°C (Dry ice)

Fill the freezebox cavity with pulverized dry ice level with the bottom of the finger grip recesses as shown. Place the heat shield onto the dry ice. Place the tube module on top of the heat shield. Tube module temperatures will quickly equilibrate to approximately -20°C and solely drop to -30°C as the dry ice sublimates. Place the tube module directly onto dry ice. Tube module temperatures will quickly reach dry ice temperatures in approximately 8 minutes. Closing the lid will not further decrease the tube module temperatures, however it will extend the cooling duration.

Note: Specific data, as shown in the figure below



## 1. Care and cleaning

Freezebox is constructed from high density closed cell polyethylene foam. Freezebox is compatible with prolonged cryogenic temperature exposure. The foam may be cleaned by water and mild soap. Rinse thoroughly. The freezebox is resistant to alcohols and 10% bleach solutions. Avoid abrasive or sharp objects. Do not use the freezebox for pulverizing dry ice. Do not autoclave. Maximum temperature exposure: 60. Avoid exposure to UV light sources. The freezebox is not recommended for shipping of temperature-sensitive samples.

## 2. Test Equipment

Temperature probe with small thermal mass such as a thermocouple probe  
Digital thermometer to match probe.  
Representative closed sample tube with cap.

## 3. Test procedure

Drill a small hole in the center of the sample tube cap with a diameter that provides a snug fit for the temperature probe wire so there will be minimal ambient air influx into the tube

Fill the sample tube with 1 ml of water

Place the cap on sample tube and insert temperature probe

Place the instrumented sample tube in any well of the tube module

Rack temperatures can be measured by direct contact of the probe in any of the rack wells

Caution: The product described here are intended for the exclusive use of the methods described. Require the use of dry ice. Direct skin contact with dry ice or metal components that have been touching dry ice can cause freezing injury. Always use appropriate protective equipment for eyes and skin when handling dry ice and cold metal components.