

# 1. Safety and General Precaution

## 1. 1 General Information on Precaution

- Precaution is to prevent the possible accident or danger during operation.  
So, you must keep it.
- Precaution is divided into caution and warning. And each of them has following meanings.



If you don't keep this warning, you can get an accident or a fire.



If you don't keep this caution, you can get injured as well as a property loss.

### 1.1.1 Safety warning symbols



## 1.2 Precaution for using the power cable



Do not make the power plug be pressed by back of the product and keep distance from wall  
(A space between the product and the plug, wall must be 30cm distance at least)



The power outlet must be only for this product.  
(Using various products simultaneously can cause a fire)  
Clean the power plug with a dry towel and connect it properly.  
(Foreign substances or unsafe connection can cause a fire.)



Do not bend the power cable hardly and do not make it to be pressed by heavy products. (When it is damaged, it can cause a fire.)



Please check the voltage & Hertz written on serial label.  
(Over-voltage, under-voltage can damage the product and poor performance.)



Do not use and touch the damaged power code and power code with wet hand.  
(It can cause an electric shock or a fire)



When you see smoke coming from the product or smell something is burning or see any other strange symptoms, you have to pull out the power code and stop using it. (It can cause an electric shock and a fire.)

## 1.3 Precaution for ground connection



Please ground before use the product, if you don't ground, you can get an electrocution when malfunction or an electric leakage occurs.



At the place where you can't ground,

\* Please buy the equipment to prevent any electrical leakage.

\* An electric shock, an electric leakage and a fire can be occurred without an electric leakage breaker.



Do not ground to these places; Gas Pipe, water pipe, pipe, lighting rod, telephone wire etc. \* Wrong ground connection can cause electrical leakage which eventually results in fire



If you don't have the outlet for AC 230V, then bury it under the ground after connecting the ground line to copper plate.

\* No ground connection can cause an electrocution, an electric leakage and a Fire.

## 1.4 Precaution for use



You must not disassemble, fix and remodel the product by yourself. Unless you are authorised personnel by manufacturer.



Do not use the product for different purpose.

(It can cause malfunction or poor function. Consequently, you will get a wrong result.)



Do not use an inflammable spray near the product.

(The switch and other electric connection parts can cause a fire.)



When you use inflammable substances such as benzene, thinner, alcohol and LP gas, please be careful. (It can cause a fire and an explosion.)



To prevent water and experiment material from going into the control panel during the experiment, make sure to clean the control panel with a dry cloth. (It can cause an electric leakage and a fire.)



Do not wash the product with excessive quantity of water, thinner, benzene and Petroleum. (It can cause an electric leakage, and malfunction or damage on the surface.)



When you don't use the product or clean it, please pull out the power plug.  
(It is to prevent an eclectic leakage.)



Open and close the door softly and please use a door knob.  
(A heavy shock can damage the product and breakdown the operating part.  
Also your hands can be stuck between the door and body.)



Do not detach the built-in lamp and electrical devices.  
(It can cause an electric shock and a fire.)



Please be sure to prevent foreign substances from getting into the sealing silicon  
of the door. (The inflow of open air can cause the change of temperature in chamber and  
discoloration of the packing part by a foreign substance.)

## 2. TRANSPORTATION, STORAGE AND LOCATION OF INSTALLATION

### 2.1 Transportation



DO NOT try to slide or tilt the unit

### 2.2 Storage



Do not keep it at Place in High Humidity. Permissible ambient humidity: max. 70%  
storage in a cold location is the place you transfer the unit to the installation site for start-  
up, condensation may form. In this case, Wait at least one hour until the CO2  
incubator has attained temperature and is completely dry.



Do not install at a humid place.  
(It causes an electric leakage accident and a corrosive of the product.)



Keep this product out of the direct ray of sun and do not install at a hot  
place or a place that is near an electric heat.  
(The proper indoor temperature is 20°C ~ 30°C.)

### 2.3 Location of installation and ambient conditions



Do not put inflammable substances near the product. (It can cause a fire)

# Stem Cell Work Station NB-803MS



When you install the product, you have to put the distance of at least 30cm from the wall.  
To completely separate the unit from the power supply, power plug must be disconnected.  
Install the unit in the way that the power plug is easily accessible  
and can be easily pulled in case of danger.



Install the unit at a flat surface, free from vibration and in a well-ventilated location.  
(If the ground is not flat, it can cause an excessive vibration of the product.)



When you move the product, do not lay down to its side or reverse the head to bottom.  
(It can cause a malfunction.)



When you move the product, hold the door and other movable parts with a tape.  
(When the product is moved, the movable door can cause injury and damage of product.)



When you move the product, you must hold up the product.  
(Pushing or pulling the product can damage the bottom part of the product.)



CO<sub>2</sub>, as well as O<sub>2</sub>, and N<sub>2</sub> are harmful in human when in high concentrations.  
Any excess has to be led out via good room ventilation or by connection to a suitable exhaust system.

## 3. PREREQUISITE

### 3.1 PREREQUISITE

#### \* Inspection of Boxes

When you have received the instrument, which is packed on a pallet carton or wooden box, inspect the box carefully for any damages that may have caused any damages to product during shipping. Please report any damage to the carrier or to your local distributor immediately.

#### \* Location

The product is designed to operate at temperature +5°C ambient,  
and recommended to operate at minimum ambient(temperature in the place for use), 15°C.  
Maximum Room Temperature is 32°C.

***To avoid place for use this product is as below.***

1. Near Heater or Freezer(if it may generate heat and affect temperature control of product)
2. Near Equipment generating heat or cold air to product.
3. Directly Sunlight Exposed to product
4. Uneven ground or table head
5. The place where is being vibrated

4. FEATURES AND SPECIFICATIONS OF THE PRODUCT

4.1 Features

- 1. Integrated equipment (clean bench, centrifuge, shaking incubator) for stem cell extraction.
- 2. HEPA filter, UV lamps for clean environment (contamination free)
- 3. Storage cabinet given for consumable or other tools.

4.1.1 Centrifuge

- 1. Multi-purpose refrigerating centrifuge (NB803MSF)
- 2. Chamber material stainless steel SUS304 + liquid powder coating
- 3. Noise will produce as minimised due to airtight compressor.
- 4. Safety device for ROTOR balance, temperature sensor

4.1.2 Shaking incubator

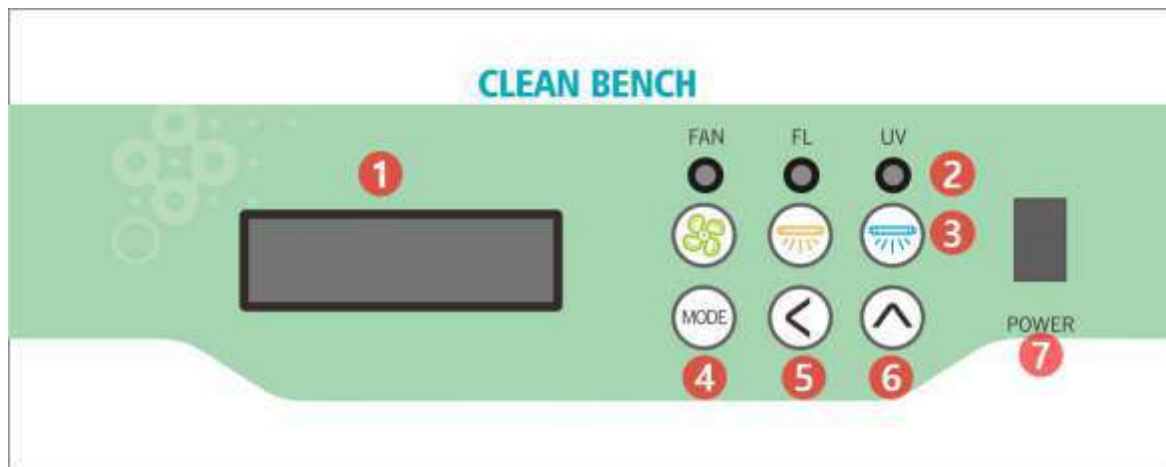
- 1. Precise temperature control
- 2. Automatic stop function when door opened.
- 3. BLDC motor provides low noise, less vibration.

4.2 Specification

Items	Unit	NB-803MS	NB-803MSF
Main filter		HEPA filter 99.99% efficiency on particles of 0.3µm	
Exhaust Filter		HEPA filter 99.99% efficiency on particles of 0.3µm	
Sterilization lamp		U.V.G 20W x 2EA	
Centrifuge			
Max RPM	rpm	5000rpm(Swing rotor)	10,000rpm (angle) / 5,500rpm (swing rotor)
Max Force		4,612 x g(Swing rotor)	13,862xg (angle) / 5,580xg (swing rotor)
Max Capacity	ml	480ml, 15ml x 32 Tubes	480ml, 15ml x 32 Tubes (Swing rotor)
Temp. range	°C	-	-20°C ~ 60°C
Main Controller		Digital PID controller	
Drive system		Inverter Motor Drive	
Timer		99hrs 59min & hold run	99hrs 59min & hold run
Shaking Incubator			
Temp range	°C	Ambient +5°C~ 60°C	
Speed Range	rpm	30~300 rpm	
Plate size	mm	250 x 310 mm	
Time Range		∞ ~ Up to 99hours 59min	
Display		LED Display	
Controller		Digital PID controller	
Dimension			
Work space	mm	900 x 640 x 620(H) mm	1200 x 600 x 620(H) mm
Overall	mm	900 x 790 x 1920(H) mm	1200 x 825 x 1920(H) mm
Power	V/Hz	230V, 50Hz, 715W	230V, 50Hz, 1.4KW

## 5. Operation of Clean bench

### 5.1 Control panel configuration



1. Display window
2. Pilot lamp for Fan, fluorescent lamp, UV.
3. ON/OFF button for Fan, fluorescent lamp, UV
4. MODE button : Fan speed (1-9, 9 being strongest) Timer setup button
5. Menu select button
6. Increase or Decrease button
7. Power switch

Note : It is recommendable to execute air circulation and sterilization by UV before use.

- 1) Turn on circuit breaker where located at the left side of equipment.
- 2) Run clean bench.
- 3) Select Fan speed from 1-9, (9 being strongest) then, inner air is circulated and particles will be filtered by HEPA filter to make the best condition for your performance.

### 5.2 UV lamp indicator



UV lamp indicator is located at the top left side of equipment to indicate UV life span.  
This lamp is on as long as clean bench is powered.

Note : There are 2 UV lamps. one is in the working space, the other one is in the HEPA filter



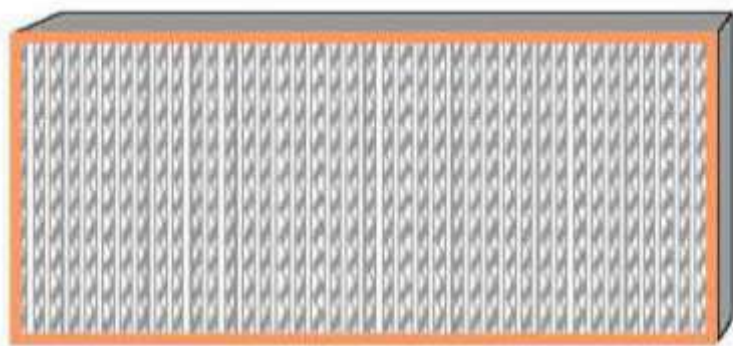
5.3 Pressure Gauge



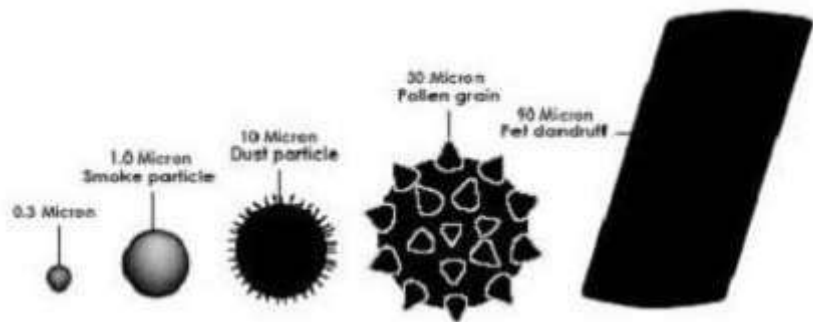
By checking pressure gauge which indicates internal air pressure, it can be realized the timing of changing filter when it indicates more than at 20. Normally, it indicates at 10

5.4 HEPA filter

is to filter particles as tiny as 0.3 micron up to 99.97%.



HEPA FILTER



Symptoms	Corrective Actions
The unit does not operate	<ul style="list-style-type: none"><li>- Make sure the power cord is plugged.</li><li>- Make sure the switch is on.</li><li>- Check a power outage.</li></ul>
Decrease of clean air inflow	<ul style="list-style-type: none"><li>- Check the contamination of the filters by use of the manometer.</li><li>Replace the filters when it requires.</li></ul>
Failure of sterilizing	<ul style="list-style-type: none"><li>- Check the operation of the U.V. lamp.</li></ul>
Malfunctions of the controller	<ul style="list-style-type: none"><li>- Check whether other high voltage electric equipment is working nearby.</li></ul>

## 5.5 UV LAMP Characteristic

### 5.5.1 Specification

1. TYPE : G20T10
2. LAMP WATT : 20W
3. DIMENSION : LENGTH 580, 588.5 mm  
DIAMETER 32.5 mm
4. SHAPE : STRAIGHT
5. CAP : G13
6. LAMP CURRENT : 0.36A
7. ULTRAVIOLET OUTPUT : 7.5W
8. AVERAGE USEFUL LIFE : 8, 000 HOURS

### 5.5.2 UV replacement

1. Turn off power switch first.
2. Take you both hands to each side of UV clip and pull them out.
3. After above procedure, take new UV lamp in exactly same position.
4. Keep wearing glove to protect hands during replacement.

### 5.5.3 Caution for handling UV lamp

UV lamp can be a harm to your eyes or human skin. Therefore, it is highly required to wear glasses or to use opaque plastic when needed to perform under UV lamp. Also, it is required not to exceed daily limitation regulated in USA at  $0.2\mu\text{W} \times 8\text{hours}$ . If a part of reflecting plate became dirty, then that part will not work as usual for sterilization. therefore, regular clean and check up is required. There is an indication of life span for UV lamp. This life span has been taken the timing of decreasing effectiveness for sterilization during lighting into consideration. So, it is required to replace with new one when the life span has reached to indication from UV lamp due to no effectiveness from decreased output even though the actual time of lighting is longer than that.

## 5.6 Fluorescent LAMP Characteristic

### 5.6.1 Specification

1. TYPE : EZ COMBI T5 FH
2. LAMP WATT : 21W
3. DIMENSION : Length(L1) 870 mm  
Width(W) 26 mm  
Height(H) 37 mm  
Length(L2) 850 mm  
Diameter(D) 16 mm
4. LAMP OUTPUT : 2100 lm
5. OUTPUT : 100 lm/W
6. BASE: G5
7. LIFE SPAN : 16000 HOURS

### 5.6.2 FL replacement

1. Turn off power switch first.
2. Remove the old lamp (there is a tension from lamp socket. push one side to take it out)
3. Install new one after abovementioned (take one side of socket first)
4. Keep wearing glove to protect hands during replacement.

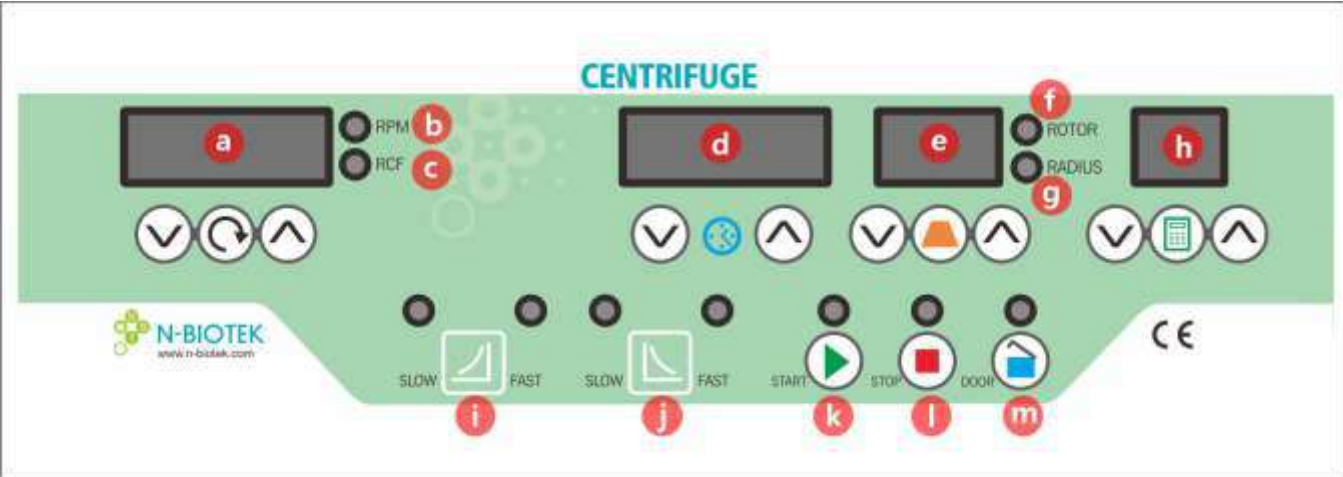
### 5.6.3 Caution for handling Lamp

1. Do not touch with wet hand
2. Do not turn on power during replacing.
3. Avoid any pressure on lamp not to be broken.



6. Operation of Centrifuge

6.1 Control panel configuration for NB-803MS



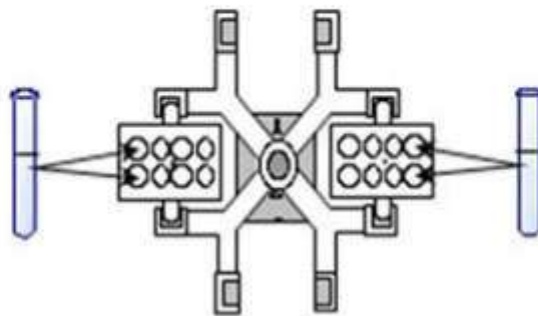
No.	Name	Function
a	Speed control & display	RPM Setting / Shows present speed
b	RPM LED	Shows RPM mode
c	RCF LED	Shows RCF mode
d	Time control & display	Timer Setting / Shows time Setting Value
e	Rotor display	Selection of Rotor number / Checking radius
f	Rotor LED	Rotor number mode
g	Radius LED	Rotor radius mode
h	Program control & Display	Program number / Program setting mode
i	Acceleration	Setting Acceleration (Slow / Fast mode)
j	Deceleration	Setting Deceleration (Normal / Slow / Fast mode)
k	Start Key	Starts the operation
l	Stop Key	Stops the operation
m	Door Key	Opening Door










Not allowed to use this function when centrifuge in operation.

## 6.2 Operation

1. Turn on the main power switch.
  2. If there are no problem, present status is shown on the display.
  3. Open the Door, put the rotor exactly.
  4. Put the tube on the buckets, close the rotor nut.
    - \* You should lock the nut strongly by using 20mm spanner.
    - If you do not lock it strongly, some damage might be occurred by unbalance.
- Put the tube on bucket as below
5. Put the test material in the tube. Volume should be same.
    - ① Test Material **has to be put on bucket with same volume symmetrically**If not, some damage might be occurred by unbalance.



6. Set each parameter by below order.
7. If you do not want program setting,  
(※ If you want to set the program, go to No.8.)
  - 7-1. Then, choose rotor number you use among them.  
Set the rotor number by using UP/DOWN key on the display  
If rotor number is set, Max.RPM of the rotor is shown.  
Press the Radius mode by pressing rotor mode key.  
Rotor radius is shown on the display (⊲)
  - 7-2. Set RPM value by using UP/DOWN Key.  
If you want to see g force, press speed mode key.(⊳)

- 7-3. Set the time by using UP/DOWN Key. (99Hour 59min.)  
If you want to use it continually, set the time to 00:00("HOLD" is shown)
- 7-4. Set the acceleration step.(Slow, Fast mode(  )
- 7-5. Set the deceleration step.(Normal, Slow, Fast mode(  )  
If 2 LED is off, It means it is under Normal mode.
8. Set the program. (available 20 Program totally)
- 8-1. Press program setting mode by using the Program mode key(  )  
(Program display is blinking.)
- 8-2. Select program number by using UP/DOWN Key.
- 8-3. Press program mode key. Setting value is save.(  )  
(Blinking of Program display is stopped.)
9. Press the Start key.(  )
10. After all progress is finished, centrifuge is stopped automatically.  
If you want to stop while it is running, press the STOP key .(  )  
Running is stopped forcibly.
11. After unit is stopped, Press the DOOR Key (  ). Door is opened  
Pick up the tube from buckets.  
Even though you press the Stop key when it is running, rotor is not stopped suddenly.  
While rotor is running, door is not opened.  
Wait until rotor is stopped completely.
12. If DOOR id opened, refrigerator is stopped automatically.
13. After using centrifuge, turn off the main power switch.
14. Be careful test material is not dropped into unit chamber while you pick it out from buckets.

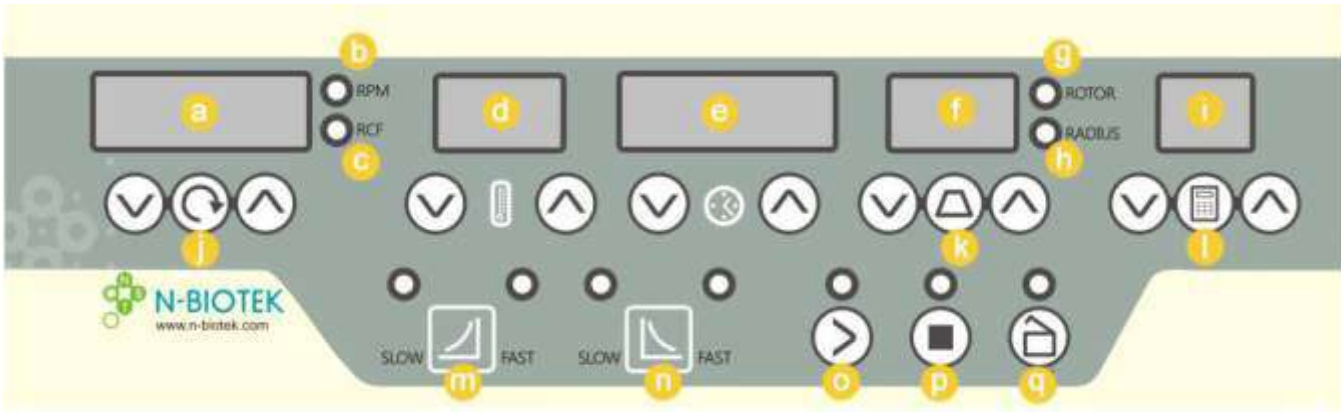
6.3 Type of Rotor and Bucket

Rotor No	Rotor / Bucket ,Tube rack	Max. RPM / RCF
bucket 32	Swing rotor 15mlx8ea(16x114mm)	4000 rpm, 3735G, round
bucket 08	Swing rotor 50mlx2ea(29x104mm)	4500rpm, 4611G, round
bucket 16	Swing rotor 15mlx4ea(17x120mm)	4000rpm, 3735G, conical
bucket 04	Swing rotor 50mlx1ea(30X115mm)	5000rpm, 5580GM conical
Bucket 04-P	Swing rotor Bucket for STEMPIA x 1ea	3200rpm

◆Error message

Signal on RPM display		Description
Err_Rotor	2	Rotor is put wrong on the unit
Err	11	Required to check wires for PCB
Err_Door	12	Door is not closed
Err_No Rotor	15	There is no Rotor.
Err_Unbalance	20	Unbalance error
Err_Over Rpm	21	Exceed of MAX RPM of Rotor.
Err_Invertor	23	There is no signal from Invertor controller.

6.4 Control panel configuration for NB-803MSF



No.	Name	Function
Ⓐ	Speed control & display	RPM Setting/ Display of Present Speed
Ⓑ	<b>RPM</b> LED	Display of RPM mode
Ⓒ	<b>RCF</b> LED	Display of RCF mode
Ⓓ	Temperature control & display	Temp setting / Display of present TEMP
Ⓔ	Time control & display	Time setting /Display of Time setting value
Ⓕ	Rotor display	Selection of Rotor number/ Checking the rotor radius
Ⓖ	Rotor LED	Display of Rotor number mode
Ⓗ	Radius LED	Display of Rotor radius mode
①	Program control & display	Selection of Program number Selection of Program setting mode
ⓙ	Speed Mode Key	Selection button of RPM and RCF
Ⓚ	Rotor Mode Key	Selection button of rotor No. and radius
①	Program Key	Button for setting program
Ⓜ	Acceleration	Slow / Fast mode for Acceleration
Ⓝ	Deceleration	Normal / Slow / Fast mode for Deceleration
Ⓞ	Start Key	START BUTTON
Ⓟ	Stop Key	STOP BUTTON
Ⓠ	Door Key	BUTTON for Door open



Not allowed to use this function when centrifuge in operation.



## 6.5 Operation

1. Turn on the Main switch on the rear side.
2. If there is no problem on the unit, current status is displayed on each display.

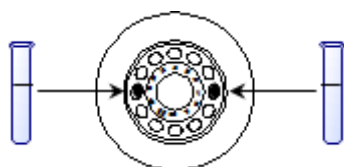
If any error message is displayed, please cut off the main power and contact your agent or N-BIOTEK.

3. Open the door and set the rotor correctly.
4. Insert the test tubes into ROTOR, and close the Rotor lid. (↻ : Open , ⌂ : Close)

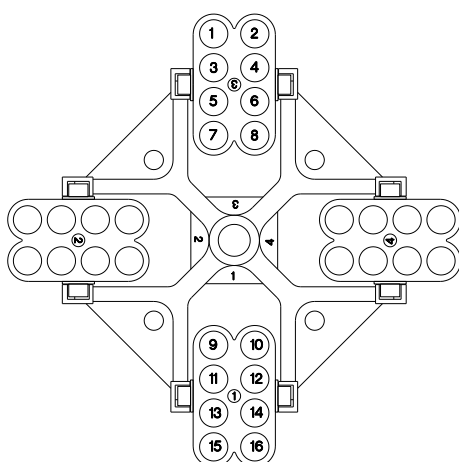
\* When you use swing rotor, please fix the nut for shaft strongly with **spanner(20mm)**.

※ TUBEs of same weight are must be inserted symmetrically on rotor.

Ex)



※ Load tubes as following method for tube racks of Swing rotor.




1. Load two tubes at position of (9 and 18)
2. Load four tubes at position of (1, 5 and 12, 16) or (7, 3 and 10, 14)
3. Load six tubes at position of (1, 3, 5 and 12, 14, 16) or (2, 4, 6 and 11, 13, 15)

5. Operating without program setting.

(※ To use program setting, please skip to next instruction of No. 6)


- 5-1. Select speed value by UP/DOWN key below speed display.


To see g force, please press speed mode key. 

- 5-2. Select temp. value by UP/DOWN key below Temperature display.

- 5-3. Select Time value by UP/DOWN Key below Time display. (99Hour 59min. is available)






If the time value is 00:00 (HOLD is displayed), it is status of hold for long run.

- 5-4. Set Acceleration profile. Slow and Fast mode is available 

- 5-5. Set deceleration profile. Normal, Slow and Fast mode is available. 

When the both of LED are turned off, it means Normal condition.



6. Operation with program setting. (※ Total 20 of Programs is available.)
- 6-1. Change to program setting mode by program mode key.   
(Program display is flickering.)
- 6-2. Select program number by UP/DOWN Key.
- 6-3. Set each parameter as per instruction 6.
- 6-4. Save all parameters by pressing program mode key.   
(Program display stop its flickering.)
7. Press Start key, the centrifuge starts operation. 
8. After complete program, centrifuge stop automatically.  
To stop it manually, please press STOP key. 
9. After stop, open the door by DOOR Key  and open the Rotor lid by turning clockwise. And then, put out the test tubes.  
During rotation, door is not opened by force. After press the brake key, rotor is still rotating. Therefore, please wait until the rotor is stopped entirely.
10. When the DOOR Is opened, refrigerator is stopped automatically.
11. After use of centrifuge, please turn off the main switch.

6.6 Type of Rotor

Rotor No	Rotor / Bucket / Tube Rack	Max. RPM / RCF
1	Swing rotor R-50S / VB-04 50ml x 1tubes	5,500RPM / 5,580 x g
2	Swing rotor R-50S / VB-08 50ml x 2tubes	5,000RPM / 4,611 x g
3	Swing rotor R-50S / VB-16 15ml x 4tubes	4,500RPM / 3,735 x g
4	Swing rotor R-50S / VB-32 15ml x 8tubes	4,500RPM / 3,735 x g
5	Swing rotor R-50S / B-40 / RK-32	3,500RPM / 2,260 x g
	Swing rotor R-50S / B-40 / RK-48	
	Swing rotor R-50S / B-40 / RK-56	
	Swing rotor R-50S / B-40 / RK-80	
6	Micro Plate Rotor VR-02M 96well x 2plate	2,500RPM / 1,152 x g
7	Angle Rotor (V5010A)	10,000RPM / 13,751 x g
8	Angle Rotor (V1524A)	10,000RPM / 13,827 x g
9	Swing rotor R-50S with Bucket-B04P For STEMPIA(SVF Isolation Kit)	3,200RPM

# Stem Cell Work Station

## NB-803MS



### ※ Reference

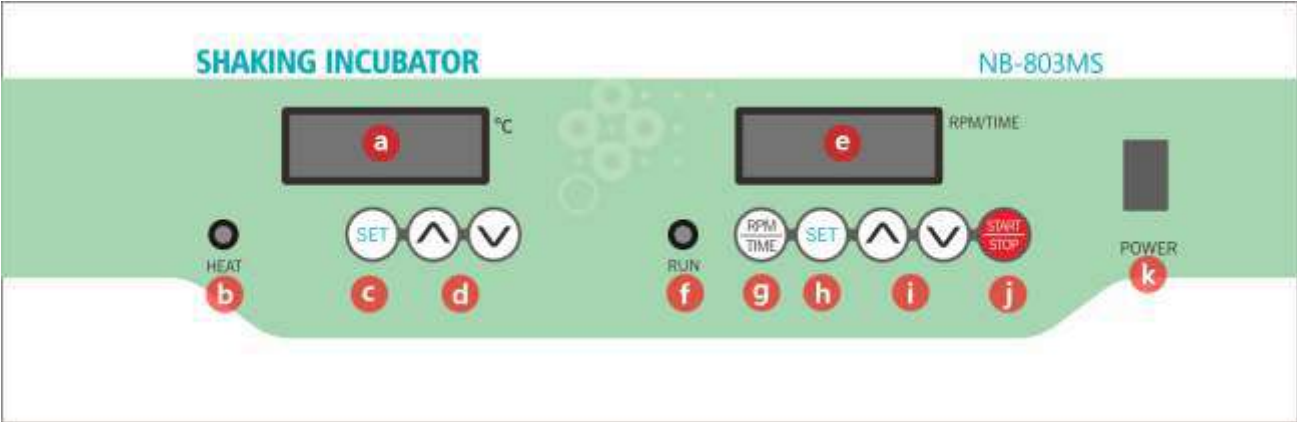
1. In case of low temperature, please set the temp. value before 30 minutes to secure cooling status. If the setting temp. is lower than ambient, refrigerator starts automatically.
2. Once you select program number, you can review all setting value of that program.
3. To check TOTAL RPM, please turn on the centrifuge with pressing of Speed mode key.
4. In case of failure of power supply, door is not opened by DOOR Key. In that case, you can open the lid forcefully by pulling out a string. You can find it on the left side of centrifuge.

### ◆Error message

Signal on RPM display		Description
Err_Rotor	2	Rotor loading is incorrect.
Err_TempSetLow	8	Exceed minimum temp. limit. (-20℃)
Err_TempSetOver	9	Exceed maximum temp. limit. (60℃)
Err	11	Required to check wires for PCB
Err_Door	12	Door error. (Door is not closed.)
Err_TempLimit	13	Current temp. in chamber is over 20 degree than setting value.
Err_NoRotor	15	No rotor is loaded.
Err_Unbalance	20	Unbalance error
Err_OverRpm	21	Exceed maximum speed limit of loaded rotor.
Err_Motor	22	Overheat on Motor
Err_Invertor	23	No signal from invertor

7. Operation of Shaking incubator

7.1 Control panel configuration



No.	Name	Function
Ⓐ	Temperature display window	Display of Temperature
Ⓑ	HEAT pilot lamp	Lamp is on when heating working
Ⓒ	SET button	Temperature setting button
Ⓓ	Adjustment button.	Up / down for temperature
Ⓔ	RPM display window	Display of RPM
Ⓕ	RPM pilot lamp	Lamp is on when shaker working
Ⓖ	RPM/TIME button	Selection button either RPM or TIME
Ⓗ	SET button	RPM/TIME setting button
Ⓘ	Adjustment button.	Up / down for RPM / TIME
⓵	START/STOP button	
Ⓚ	Power switch.	



◆ Safety Switch for shaking incubator.

This is safety switch to prevent the heater from overheating when the temperature controller is malfunctioning.  
Please set the value at least 30°C higher than setting point.

## 7.2 Operation

1. Turn on power switch. The digital readout will display as below



Temp display

(present temperature when turned on)



RPM/TIEM display

(Message when turned on)

2. Temperature, TIEM, RPM set up

2.1 Place power switch ON, current temperature in chamber will be displayed.

2.2 Press SET key for either temperature or RPM or TIME.

Then, press SET key once again to save value.

## 7.3 Troubleshooting for Shaking incubator



Above message may occur when operation is not working by force

- Solution :

Rotate platform by your hand and push STOP button at the same time.

And then, press SET button to raise RPM that you are desired.



Above message may occur when rotating faster than set point (This may be from 200RPM).

This could be a symptom of momentary noise

- Solution :

Please try starting again after power off or it may return to normal within 3 min.



Above message is to notify you that the time is up



Above message may occur when electricity is coming back after power failure

- Solution :

Press START button again.



Above message may occur when electricity is off during operation

- Solution :

N(new record) will be changed to R(rpm) if you press START button.

**Appendix I - Foot switch (OPTION)**

■ FOOT SWITCH

This foot switch allows you to save the waste of using redundant hands move during performing.



- ① CENTRIFUGE START FOOT SWITCH
- ② CENTRIFUGE STOP FOOT SWITCH
- ③ SHAKER START/STOP FOOT SWITCH
- ④ SUCTION START/STOP FOOT SWITCH
- ⑤ FOOT SWITCH CONNECTOR

⑥,⑦ Both Terminal should be matched up when connecting



Image when separated from Beauty cell.

\*Suction cable is optional.