CO_2 Incubator Operation Manual

Model: MINI-CELL
NB-203M

N-BIOTEK
Leading Life science

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● Warranty

Thank you for choosing N-BIOTEK product.

This operation manual describes practical information such as performance, usage, cautions and notices for use of the product.

So, before using the product, please read it carefully all the safety instructions described in this manual and keep this manual for future use.

Model	NB-203M		
Date of Installation	mm-dd-year	Supplier	
Serial NO.		Period	1 year

N-BIOTEK product is warranted from defect in all parts and workmanship. This product is warranted for 1 (one) year against faulty components and assembly. Our obligation under warranty is limited to repairing and replacing the instrument or part after our examination.

This warranty does not extend to any N-BIOTEK products which has been misused, neglected, accident or mis-installation, application.

1. The free warranty service will be provided once the unit is proved to be defective by wrong workmanship after N-BIOTEK or reliable distributor's examination.

2. The warranty period is 1 year from date of installation or 1 and half year from the date of shipment from N-BIOTEK, whichever is sooner as indicated in above table. This period is proved by serial number.

3. N-BIOTEK will not be responsible of free warranty service for the faulty caused by user's improper operation, excessive use, use of incorrect voltage & frequency, storage in wrong environment mentioned in Manual.

4. Complete the above table after installation and keep this card. Then, present it to a dealer or N-BIOTEK when warranty repair is needed.

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● 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.

⚠ **Warning**	If you don't keep this warning, you can get an accident or a fire.
⚠ **Caution**	If you don't keep this caution, you can get injured as well as a property loss

Other marks:

⚠ **Warning**	⚠ **Caution**	❗ **Compliance**	🚫 **Prohibition**	**No disassemble**	**Remove plug**	⏚ **Ground**

1. Precaution for using the power cable

❗ **Compliance**   Do not make the power plug be pressed by back of the product.
(A space between the product and the plug must be 30cm at least.)

❗ **Compliance**   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.)

🚫 **Prohibition**   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.)

🚫 **Prohibition**   Do not touch the power cord with wet hands. (It can cause an electric shock.)

🚫 **Prohibition**   Do not use the damaged power cord and outlet.
(It can cause an electric shock and a fire.)

Remove plug   When you see smoke coming from the product or smell something like burning or see any other strange symptoms, you have to cut off the power cord and stop using it.
(It can cause an electric shock and a fire.)

2. Precaution for ground connection

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

Compliance 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.

Prohibition 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.

Compliance If you don't have the outlet for AC 220V, then bury it under the ground after connecting the ground line to copper plate.
  * No ground connection can bring an electrocution, an electric leakage and a fire.

3. Precaution for use

No disassemble You must not disassemble, fix and remodel the product by yourself.
(You can damage the product to a fire and malfunction or get a property loss as well as experimental loss.)

Prohibition Do not use the product for different purpose.
(It can cause malfunction or poor function. Consequently, you will get a wrong result.)

Prohibition Do not use a flammable spray near the product.
(The switch and other electric connection parts can cause a fire.)

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

Compliance 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.)

Compliance 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.)

Compliance Please leave the product power off when it is not in use.
(It is to prevent an eclectic leakage.)

Compliance Open and close the door softly and please use a door knob.
(A heavy shock can damage the product and breakdown the operating part.)

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

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

● **Transportation, Storage and Location of Installation**

1. Transportation

Prohibition DO NOT try to slide or tilt the unit.

Compliance Permissible ambient temperature range for transport: -10℃ to 60℃.

2. Storage

Compliance 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.

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

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

Prohibition 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 room temperature is 20℃ ~ 30℃.)

3. Location of installation and ambient conditions

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

Compliance
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.

Compliance
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.)

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

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

Compliance
Excessive CO_2 is harmful to human when in high concentrations.
Any excess amount of CO_2 has to be led out via ventilation or by connection to a suitable
exhaust system.

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

● Prerequisite and Configuration

1. Prerequisite

Inspection of Boxes

When you have received the instrument which is well boxed, inspect the box carefully to check any transit damage.
Please report any damage to the carrier or to your local N-BIOTEK distributor immediately.

Location

The incubator is designed to operate at temperature 5℃ above ambient, and recommended to operate at minimum ambient(temperature in the place for use), 18℃. Maximum Room Temperature is 32℃.

To avoid place for use this incubator is as below.

1. Near Equipment generating heat or cold air to incubator
2. Directly Sunlight Exposed to incubator
3. Uneven ground or table
4. The place where is being vibrated

Cleaning before use

Before conducting cell culture, it is recommended to clean up entire chamber and shelves and water tray by using dry cloth with at least 70% Ethanol mixed of 30% distilled water.

※ **Notes on Humidity**

✓ For long-term culture with this product, please use a tray with a small surface.
✓ It is recommended to use a large surface tray when the door of product is frequently opened/closed, and when a quick restoration of humidity is required.
✓ It is recommended to use the appropriate size of tray according to the culture situation and conditions.
  (※ When using a lager surface tray, condensation may form in the chamber.)
✓ After using the product (power OFF condition), please be sure to remove the tray out of the chamber.
  (※ It may cause the condensation.)

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2. Configuration

<Figure #1> Front Side

Control Panel

Handle for carrying

Door Handle

Finger Supporter for door close

<Figure #2> Inner Side and Rear Side

IR CO_2 Sensor

Door Sealing Gasket

Stainless Steel Panel

Stainless Steel Shelf

Water Container

Circulation Fan

<Figure #3> Rear of Incubator

Serial Label

Power Switch

Power Input Receptacle /
DC12V Car Jack Receptacle

CO_2 Input Port

CO_2 Sample Port

Air Circulation   Cooling Fan

Foot of Incubator with non-slip rubber

Note

The tube diameter of CO2 inlet port is ⌀4 x 2mm (total diameter 4mm, hole 2mm). A connecting tube for CO2 inlet port is provided as well as normal size of tube (6 x 4mm) which is for connecting to CO2 cylinder.

<Figure #4> Basic Parts included in the package

1. Stainless Steel Shelf (2)
2. Stainless Steel Water Container for humidity (1)
3. Power Cord (1)

4. DC12V Car Jack (1)

5. AC DC Adapter (1)

● Feature and Specification

1. Feature

1. Light weight, easy to carry concept of 16-liter portable mini CO2 incubator.

2. Compact size for workstation or clean bench.

3. Precise temperature control by Peltier. (ambient -8℃, lowest temp. is 15℃ at 23℃ RT)

4. Suction fan makes air to the bottom for air circulation.

5. Natural Humidification System by water tray on the bottom.

6. 12V car jack is provided for the transport in a car.

2. Specification

Item	Specification
Chamber Volume	15.2 liter
Temperature Range	15℃ ~ 45℃ at Ambient 25℃
Temperature Accuracy	±0.25℃ at 37℃
Temperature Control	Micom
CO2 Range	0 ~ 20%
CO2 Sensor	Dual Beam IR sensor
CO2 Accuracy	±0.1% at 5%
Humidity	Up to 80%
Gas Pressure	1 Bar
Display	LED Display
Cooling & Heating	By Peltier (thermoelectric elements)
Shelf	2ea, Stainless steel
In & Outside Material	ABS resin
Inside Dimension	224(W) x 200(D) x 340(H)mm
Outside Dimension	292(W) x 333(D) x 433(H)mm
Weight	6.8kg
Power	DC 12V/7A, AC100 ~ 240V, 50/60Hz
Option	
203M-HOLE	Ø12mm(Dia) Access Port with Silicon Stopper
203M-SHELF	Additional Stainless Shelf (one piece of shelf)

● Control Panel
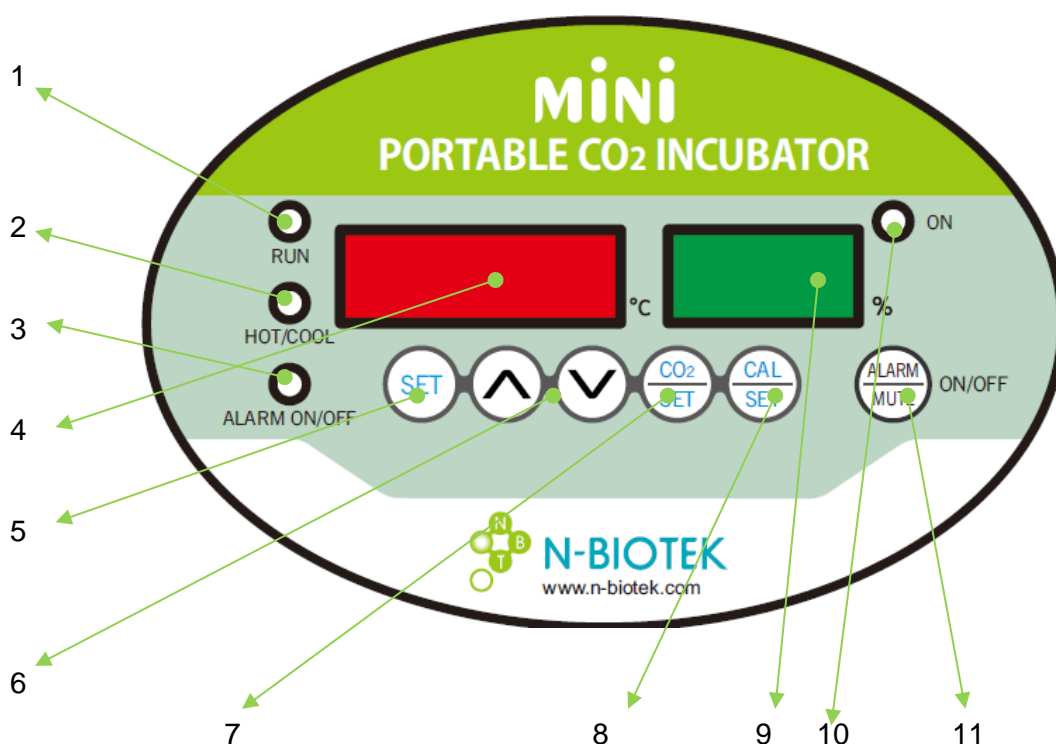
1. RUN LED Lamp : Normal – 2Hz Blink / Failed – 10Hz Blink

2. HOT/COOL LED Lamp : RED(Heating) / BLUE(Peltier – Cooling)

3. ALARM ON/OFF LED Lamp: No LED Lamp(ON) / RED(OFF)

4. Temperature LED Display

5. Temperature Setting Button

6. Adjustment Button (Up & Down)

7. CO_2 Setting Button

8. Calibration Button

9. CO_2 LED Display

10. CO_2 Gas Inlet Indicator : For CO2 gas supply activation

11. ALARM/MUTE Button

● Operation

Please check the connection of gas supply. And open CO2 gas cylinder for supply with the pressure of regulator set to a certain level.

<Co2 incubator Set-up Process>

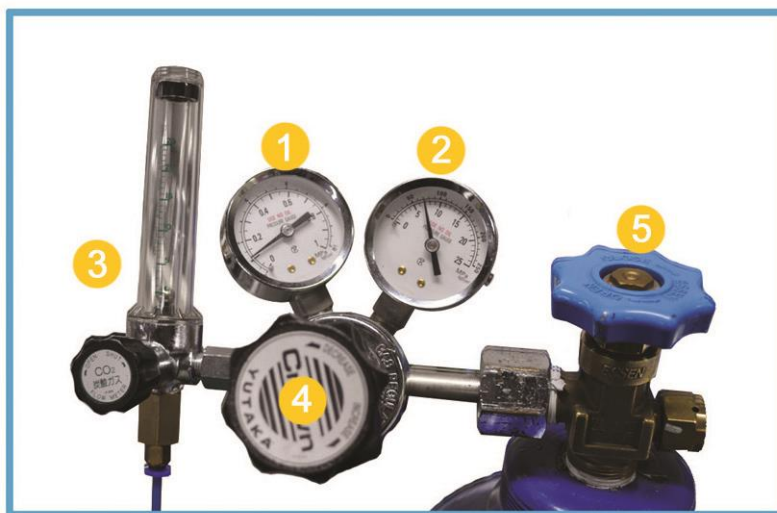| Connect CO2	→	ON POWER S/W	→	Set-Up TEMP	→	Set-Up CO2	→	Set-Up Safety S/W

1. Place and Install the Product

Install the product at the desired place and check the level in all directions (side by side, front to back and ground).

2. Connect the Power

Prior to connect the power plug, make sure that the POWER S/W is OFF.

3. Connect the CO2 Gas

1. Regulator Pressure Gauge
2. Bombe Pressure Gauge
3. Flow Meter
4. Regulator Valve
5. Master Valve

▶ Check whether CO2 gas is leaking at any point of regulator.
    If leak is found, please take measures to stop leaking before supply of CO2 gas to incubator.

▶ Clear the air passage for gas input gasket at the rear of the unit.
    Also check the gas tube and get rid of any obstacles for smooth gas flow.

▶ Before supply of CO2 gas into incubator by gas tube, check the remaining gas volume in CO2 Gas cylinder.

▶ When previous stage is cleared, connect the gas tube to regulator and incubator.
 At this point, make sure that valves of all the part besides gas cylinder, Regulator are locked.
 (④ and ⑤ have the opposite lock direction each other. ④ is clockwise and ⑤ is counterclockwise)

▶ Open #5(Master valve of cylinder) and #4(the regulator valve), #3 Flow meter. While Flow meter fully open, do adjust regulator valve up to 1.0 bar).

(!) Compliance	Pressure gauge may be difference from each gauge manufacturer. If Regulator's pressure is too high, it causes malfunction of the CO2 control. Therefore, it is highly recommendable to find a right level of pressure by user.

4. Power Switch On

Turn on the power switch in line of power cable. Then, digital LED will display current temperature and CO_2 % in chamber after below message passed in short time.

Temp. Display   CO2 Display

5. Setting Temperature

a. Connect the power, then the LED screen will display the temperature in the chamber.
b. Press the "SET" button, then, the LED screen will flicker and display.
c. Then, input the desired temperature by pushing UP (▲) and DOWN (▼) buttons.
d. Press "SET" key again after putting the desired value. "SAVE" is shown up on the LED screen as below.

Note:

If you don't press "SET" button after set-up, the new set-up value will not be saved at all.

Set-up Temperature range is 15°C ~ 45°C at ambient 25°C.

6. Setting CO2

     a. Press "CO2/SET" button. Then, LED screen will flicker continually.

     b. Input the desired value of CO2 density by pushing UP (▲) and DOWN (▼) buttons.

     c. Press "CO2/SET" key again after input. "SAVE" is shown up on LED screen as below.

Note:

If you don't press "CO2/SET" button after set-up, the new set-up value will not be saved at all.

7. Calibration for Temperature and CO2

(!) **Compliance**   Please follow up below procedure for calibration in case of discrepancy between actual value (measured by reliable measurement device) in chamber and displayed value.

⚠ **Caution**   Measure CO2 density and Temperature after incubator is stabilized in which takes about more than 2 hours. (You might want to perform this stabilization process at night before home.) Please note that low deviation range such as ±0.1 ~ 0.3% may not be corrected precisely by this calibration.

a. Press and hold "CAL/SET" for 10 seconds. Then, LED will be flickering as below.

     Channel 1 is at chamber's Main Temp calibration stage.

     Press UP (▲) as much as difference from measured value by precise analyzer if it is higher.

     Press DOWN (▼) as much as difference from measured value by precise analyzer if it is lower.

     Ex) If measured temperature is 38℃ and Display shows 37℃, then press up 1℃.

Note:

* Calibration range for temperature is ±5℃.

* To go to next channel is to press "CAL/SET" button.

 After 6th channel, the LED is back to temperature display.

(!) **Compliance**   No Function! Just skip this stage by pressing set button once.

Compliance ⓘ   No Function! Just skip this stage by pressing set button once.

b. Fourth Click "CAL/SET": CO2 Density Calibration

Channel 4 is at CO2 density calibration stage.

Press UP (▲) as much as difference from measured value by precise analyzer if it is higher.

Press DOWN (▼) as much as difference from measured value by precise analyzer if it is lower.

Ex) If measured CO2 value is 5% and Display shows 4%, then press up 1%.

c. Fifth Calibration Setting: Heating Control

NOTE:

Channel 5 is to set heating control point and is designed to prevent a significant temperature overshoot. This mode is preprogrammed in the factory and should NOT be adjusted by the user.

d. Sixth Calibration Setting: CO2 Gas Supply Control

NOTE:

Channel 6 is to set the values associated with the CO_2 control solenoid.

This mode is preprogrammed in the factory and should NOT be adjusted by the user.

* When above stages are cleared, please press CAL/SET button to save all new values.

8. Humidity

Mini CO_2 incubator adopts natural humidity system by water container as below image.

Please fill up distilled water up to the water line of water tray and keep lid closed for proper humidity level (at about 80%) during operation of incubator.

Place the water container be close to back of chamber so the container is more exposed to heated air directly from water pass.

※ *No water is recommendable when carrying this incubator.*

In case that humidity is necessary during carriage, ensure the water container to be securely held at bottom of chamber(like using sticky mat or tape) and wet sponge or sterilized gauze is recommendable rather than filling water. In this situation, humidity may not be reaching to maximum or normal humidity like normally max humidity up to 80%.

9. Alarm

Turn alarm system ON by pressing alarm button for about 5 seconds. When switching alarm on or off, a short alarm will come out. When alarm system is on, LED lamp is OFF. When alarm system is off, LED lamp of alarm is lighting to indicate that alarm system is disarmed.

In order to activate alarm system, it should maintain $\pm2°C$, $\pm1\%$(CO2) from set point for 3 minutes.

This course is recognised as stabilizing process.

After stabilizing process, alarm system will be armed and alarm event is as below.

Alarm Activation

Temperature : (bird singing)

- If it stays out of $\pm1°C$ from set point for 8~9 minutes, it will give you an alarm.

- Alarm will automatically stop once temperature is recovered into tolerance range.

- Pressing mute button once will give 10 minutes delay.

CO2 : (bird singing)

- If it stays out of $\pm1\%$ from set point for 8~9 minutes, it will give you an alarm.

- Alarm will automatically stop once CO2 is recovered into tolerance range.

- Pressing mute button once will give 10 minutes delay.

Door Open :

- Alarm comes out 30 seconds after door opening.

 And no alarm come out if door is closed within 30 seconds.

- If door is closed during alarm, alarm will stop immediately.

- Pressing mute button in the situation of door open will give 3 minutes alarm delay.