## **OPERATING MANUAL**

# CO<sub>2</sub> Shaking Incubator with 2 Built-In Shakers <NB-206CL>



## **INTRODUCTION**

Thank you for purchasing our NB206CL, CO2 incubator and Shakers.

This operation manual describes practical information such as performance, usage, and 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.

## WARRANTY

Model	NB-206CL		
Date of Installation	mm-dd-year	Supplier	
Serial NO.		Period	1 year

N-BIOTEK provides a warranty on all parts and factory workmanship. The warranty includes areas of defective material and workmanship, provided such defect results from normal and proper use of the equipment.

- 1. The free warranty service will be provided once the unit is proved to be defective by wrong workmanship after NBIOTEK 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 NBIOTEK, whichever is sooner as indicated in above table. This period is proved by serial no.
- 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.

## PRECAUTION

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



Other Marks



#### 1. Precaution for using the power







Do not use the damaged power code and outlet. (It can cause an electric shock and a fire.)



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

#### 2. Precaution for installation





Use it with the proper voltage. Please check the voltage & Hertz written on serial label. (Over-voltage, low-voltage can damage the product and poor performance.)

 $\oslash$ 

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  $20^{\circ}$ C ~  $30^{\circ}$ C.)



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





The product requires the distance of at least 20 cm from the wall for well ventilation. (When ventilation works well, you will use the product satisfyingly regarding a cooling ability and a heat.)

Install at a flat and solid place. (If the ground is not flat, it causes a vibration of the 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.)



When the movement of the product is required, please tie up the door and other movable part with a tape.

(Able to get an injury by opening door and get a damage of the product.)

#### 3. Precaution for use





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



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

#### 4. Precaution for ground connection



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



At the place where you can't ground,

\* Please buy the equipment to prevent electric leakage.

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

WARNING -----



Do not ground to these places; Gas Pipe, water pipe, pipe, lighting rod, telephone wire etc. \* Wrong ground connection can occur an electric shock, an electric leakage and a fire.



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 occur an electric shock, an electric leakage and a Fire.

#### • SUSPENSION CELL CULTURE CO2 INCUBATOR

This incubator is aimed at culturing suspension cell and mammalian cell such as CHO, HEK, HELA, Etc.

#### • IR CO2 SENSOR

Precise CO2 detection allows maintaining excellent CO2 uniformity.

#### • EXCELLENT TEMPERATURE CONTROL

6 Sides Direct Heating with P.I.D control provides uniform temperature distribution and fast heat-up & recovery time on installation or after opening door. Forced air circulation fan located at the top of the chamber makes Horizontal Air flow and circulate air in chamber naturally. Combined Natural & forced Heat Convection system enhance temperature uniformity throughout inside chamber

#### HIGH & NATURAL HUMIDIFICATION

Wide humidity tray allows high & natural humidity consistently and easy-cleaning.

#### HUMIDITY DISPLAY

Possible to check the real humidity through the humidity display.

#### • INNER GLASS DOOR

Possible to check the current operation through glass door.

#### INDIVIDUAL SHAKER CONTROL

Able to control 2 shakers separately, possible to culture with the different RPM.

#### SLIDE SHELVES

Because shelves can be pulled out, a user can put a culture vessel at inner space of the chamber easily.

#### STICKY MAT & VARIOUS HOLDERS

Possible to maximize the available space through the Sticky Mat, and also able to attach various sizes of a holder.

#### • STAIN-RESISTANT INTERIOR

This product is designed properly to a GMP facility, because it is never rusted through all-stainless composition.

#### • \*DO NOT STACK EACH OTHER\*

This product is designed properly to use at ground as itself. Please do not stack NB-206CL with another NB-206CL. It will be vibrated even low RPM and it's very dangerous to users. If you need to stack them, please note all 4 shakers' rpm have to be lower than 100rpm.

## CONFIGURATION





- 1 CONTROL PANEL
- 2 GLASS DOOR
- 3 SHAKER
- 3 SLIDING SHELVE
- OUTER DOOR
- 6 POWER
- CO2 INPUT PORT
- 63 SAFETY S/W

#### • SLIDING SHELVE



## SPECIFICATION

Items	Unit	NB-206CL
INCUBATOR		CO2 INCUBATOR
Temp. range		Ambient +5°C to 50°C
Temp. accuracy		±0.25°C at 37°C
Controller		Microprocessor Digital PID Control
Humidity		≥70% at 37℃
CO <sub>2</sub> range		0% to 20%
CO <sub>2</sub> accuracy		±0.1% at 5% at 37℃
CO <sub>2</sub> increment		0_1%
CO <sub>2</sub> sensor		IR CO2 Sensor
Outer door		Silicon Packing Magnet Door
Inner door		Tempered Safety Glass Door
Display		LED Display
Jacket type		Dry wall type (6 sides direct heating type)
Capacity		179Liter
Shelves		2ea
Chamber dimension		473(W)x528(D)x710(H)mm
Overal dimension		560(W)x665(D)x945(H)mm
Power		110/220V, 50/60Hz
SHAKER		Built–in Shaker
Motion		Orbital
Speed range		30 to 200 Rpm
Speed accuracy		±1 rpm
Speed increment		1 rpm
Time range		Continuous or up to 47hours 59min
Time increment		1 min
Motor		Plate type BL/DC motor
Drive System		Beltless direct drive
Orbit diameter		22mm
Platform size		300(W)x330(D)mm
Shaker Dimensions		305(W)x350(D)x75(H)mm

## PROCESS & CONTROL PANEL

#### PROCESS



#### • CONTROL PANEL

#### **CO2 INCUBATOR CONTROL PANEL**



#### SHAKER CONTROL PANEL



## **INSTALLATION & OPERATION**

#### **1. CO2 INCUBATOR**

#### (1) GETTING STARTED

#### 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 plug



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

#### 3) Connect the CO2 Gas supply



- Check that gas is leaking at the seam or pipe of the Regulator.
  If gas is leaking at any part, please take an action to stop leaking before providing the CO2 Gas to the 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 connecting the incubator to Gas tank by blue tube, check the remaining gas volume in CO2 Gas cylinder. Also, be sure to close the regulator valve and flow meter. Then, put the hose the connection hole of regulator and also put it to the hole at the rear of incubator. Make sure valves of all the parts beside Gas tank, 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(regulator valve), #3 Flow meter. While Flow meter fully open, do adjust Regulator Valve at 0.1MPA(0.3bar).

Another regulator valve in the path of gas flow is installed and adjusted already to control the gas pressure. So, adjustment for flow meter is not required.

However, in case that the ball in flower meter exceeds level 2, close the flow meter until the ball is placed lower than level 2.



The pressure gauge may be difference according to its manufacturing companies. If Regulator's pressure is too high, it causes malfunction of the CO2 control.

4) After initial set of regulator, check the solenoid valve works well with sounding. Also, observe the CO2 density on display goes up well. The solenoid valve starts to control open and close at 3% of density in Chamber.



Before set temperature of incubator, place the water tray filling distilled water in chamber if the humidification is required. Place the water tray at the bottom compartment

#### (2) POWER S/W ON

Press the POWER S/W on the right side of the product. The CO2 Control Panel Display will be shown as follows.



#### (3) .TEMPERATURE SETTING

- a. <u>Turn on the Power S/W.</u> Then, the LED screen will display the temperature in the chamber.
- b. <u>Press the "TEMPSET" key</u>. Then, the LED screen will flicker and display.
- c. Then, set the desired temperature by pushing UP (▲) and DOWN (▼).
- d. <u>Press "TEMP/SET" key again</u> after putting the desired value. "SAVE" is shown up on the LED screen like below.



After a set-up, the LED screen will stop flickering.

- \* If you don't press the "SET" key lastly after set-up, the new set-up value will not be saved at all.
- \* Set-up Temperature range Ambient + 5°C~ 50°C.



The maximum temperature resistance of IR CO2 sensor is 90°C.

#### (4) HUMIDITY

**Showing humidity (%)** is useful to check real humidity in chamber and to recognize the time of water Supplement in water pan. For humidification, a water tray is placed on the bottom of incubator. As the temperature in chamber goes up, water in tray provides moisture to the chamber inside.

HUMIDITY cannot be set due to natural humidity circulation system.

#### (5) CALIBRATION

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



Measure CO2 density and Temperature after incubator is stabilized in which takes about more than

<sup>1</sup> 2 hours (you might want to perform this stabilization process at night before home) Please note that low deviation range such as  $\pm 0.1 \sim 0.3\%$  may not be corrected precisely by this calibration.

No.	DISPLAY	FUNCTION	
1	888.8.8	Chamber Temperature	
2	8.8.8.0.0	Door Heater Temperature	
3	88888	Glass Door Heater Temperature	
4	88888	CO <sub>2</sub> Deviation Calibration	
5	85888	Heating On Off Range Control (Factory Setup Only, DO NOT CHANGE)	
6	88888	CO <sub>2</sub> gas supply speed control (Factory Setup Only, DO NOT CHANGE)	
7	8.5.8.8.8	To apply a new value	

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 ( $\blacktriangle$ ) 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  $^\circ$ C and Display shows 37  $^\circ$ C, then press up 1  $^\circ$ C.

#### Note

- \* Calibration range for temperature is  $\pm 5\,^\circ\!C$
- \* To go to next channel is to press "CAL/SET" button. After 5<sup>th</sup> channel, the LED is back to temperature display.

#### b. Second Click "CAL/SET" 🖙 Outer door's Temp calibration





Channel 2 is purposed to remove water condensing on glass door caused by high temperature difference between chamber and outside. Recommend to use calibration at Channel 2 in case of water condensing on glass door.

#### Note

Except water condensing on glass door, calibration of channel 2 and 3 is not recommendable. Check if the water condensing is removed in 3 Hours after calibration of CH2 is done.

#### c. Third Click "CAL SET" 🖙 Door Frame Heater calibration



Channel 3 is purposed to remove excessive water condensing on glass door caused by high temperature difference between chamber and outside. When failed to remove water condensing by caution calibrating CH2, try to calibrate.

d. Fourth Click "CAL SET" 🖙 CO2 density calibration



Channel 4 is at CO<sub>2</sub> 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 CO<sub>2</sub> value is 5% and Display shows 4%, then press up 1%.

#### e. Fifth Click "CAL SET" 🖙 Heating control

\* This is pre-programmed mode before releasing from manufacturer.



Push UP ( $\blacktriangle$ ) and DOWN ( $\triangledown$ ) to set the value

#### NOTE

Channel 5 is to set heating control point.

If it is set at 3, then the heating control works from 34'C against setting value i.e. 37'C.

This is in order to minimize overshooting and faster reaching time to setting value.

Therefore, user is kindly required not to change this value.

#### f. Sixth Click "CAL SET" 🖙 CO2 gas supply control.

\* This is pre-programmed mode before releasing from manufacturer.

000	DO
0.0.0	<b>D</b> U

Push UP ( $\blacktriangle$ ) and DOWN ( $\triangledown$ ) to set the value

#### NOTE

Channel 6 is to set starting point of solenoid control for CO<sub>2</sub> supply.

Factory pre-programmed set point is at 2 to optimize set-up at 5% and it means that  $CO_2$  control value is in open position until the  $CO_2$  density reaches to 3%. From 3% of  $CO_2$  to setting value, solenoid value takes control of  $CO_2$  supply until it gets to setting value.

When above stage is cleared, please press the button to save the new value.



#### (6) ALARM

Alarm warns audibly in case of door open, fault of temperature & Co2 gas. To activate Alarm sensing, place alarm S/W at "On".

#### 1. Door Alarm (short beep sound)

- Alarm occurs when the outer door is open for longer than a minute.
- Alarm does not activate if door closed is within 1 minute after door open.
- After 1 minute since door open with alarm ongoing,
- --> 1. Alarm stops in 2.5 seconds after the outer door is closed.
- --> 2. Alarm stops when the alarm mute button is activated but the buzzer sounds.
  - \* The door alarm operates regardless of the temperature or the CO2 condition.
  - \* The door alarm maintains continually unless door is closed or alarm S/W at "OFF"

#### 2. Temperature Alarm (short beep sound)

► Alarm program gets ready when ±3°C deviation to the setting value lasts for more than 3 min. From this moment, the deviation to the setting value fails to go into ±2°C for 8~9 min, the alarm will activate.

▶ To press mute button is to stop alarm. But, Alarm will regularly activate at every 2 and a half min. Because, this program is to give an attention to user who is back from absence.

► To disarm continuous alarm is to do re-start Alarm sensing program by turning Alarm S/W off and on.

#### 3. CO2 Alarm (long beep sound)

Alarm program gets ready when  $\pm 1\%$  deviation to the setting value lasts for more than 3 min. From this moment, the deviation to the setting value fails to go into  $\pm 1\%$  for 8~9 min at least, the alarm will activate.

- ► For stopping the alarm temporarily, press the Alarm mute button. But even if mute is applied and CO2 recovers in ±1% from the deviation, alarm sounds per every 2 minutes and 30 seconds to continuously warn its fail experience unless alarm is re-programmed.
- ► To disarm continuous alarm after experiencing CO2 error, do re-start Alarm sensing program by turning Alarm S/W off and on.

#### (7) SAFETY S/W



This is the safety device for preventing a temperature rise caused by any occasion arisen, so set the temperature at  $5^{\circ}$  higher than the setting value.

Using at higher temperature: Set SAFETY S/W higher than the set temperature.



- EX) If the setting temperature is 37°C, set SAFETY S/W in the rear of the product at about 42°C. You can identify its activation point by lighting of pilot lamp. At the set point, turn the safety dial and recognize its deviation. Considering the deviation, set the safety 5°C higher than set point.
- You are kindly required to check the setting position that might be unintended by us due to transportation.



When the SAFETY S/W is activated with lighting of safety pilot lamp, this limit cuts the heater increase the temperature during the experiment, you must turn off the SAFETY S/W.

#### **% 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.)

### 2. SHAKER

NB206CL allows controlling 2 shakers individually through each control panel.

#### (1) Time Setting

a. When you <u>turn on the "Power S/W"</u> on the right side, "N-BIO" is shown on the screen for a moment and disappeared.



b. When you press the "RPM/TIME" button, t 00.00 is displayed and you need to press the "SET" button and check the display flickers at this moment



- c. During the display flickers, you can set the hour through <u>pressing "(UP) ▲ (DOWN) ▼" keys</u> and after setting the hour, you can set the minute through the same way with setting the hour.
- d. <u>Press the "SET" key</u> after setting the time (hour and minute), then the screen displays "t SAVE" as below.



#### (2) RPM Setting

- a. After the time setting is completed, <u>press the "RPM/TIME" button</u> again, then the display will show the original RPM value.
- b. Press the "SET" button, then RPM display will flicker.
- c. You can set the RPM through pressing "▲, ▼" keys during the display is flickering.
- d. After setting the desired value, <u>press the "SET" key</u> again then, the screen displays "r SAVE" as below



After Setting the RPM is also completed, <u>press the "START/STOP button"</u>, then the product will operate as saved time and RPM.





Time and RPM setting are only possible when the product is completely stopped. (You can check the shaker's status through the "RUN" lamp on left top of the RPM/TIME display. When the shaker is not running, the pilot lamp is off. When the shaker is running the lamp flickers faster as RPM value.)



Time set-point range is maximum 47hr 59min.,



When the time reached at the set time, -END- will be shown on the display and the shaker stops automatically, but if you want the product keeps operating without stopping, then input 00:00 for the time. When you set the time as this, -END- will be displayed after a minute since the product operates, but the operation will not stop until you press the "STOP" button.



The RPM range is 30 to 150RPM with maximum loading of flasks shown in table of load capacity



When more flasks than the maximum capacity are put on the platform, the shaker might not work as the set RPM.

#### (3) Detachable Shakers

When the product requires cleaning chamber and shakers, It is hard to wipe everywhere in the chamber without detaching shakers and shelves.

NB206CL shakers and shelves in chamber are able to be detached freely. So a user can move and clean the product easily.

Follow is the step to detach shakers and shelves from the product.



**Ensure** the product is turned off completely

Unplug the shaker cable at the back of the chamber

Take out the shaker carefully

Unscrew two bolts on the front edge of the shelf.

Pull out the shelf carefully









## APPEARANCE



For more information about N-BIOTEK products, please visit us at <u>www.n-biotek.com</u> or e-mail us <u>export@n-biotek.com</u>

