OPERATING MANUAL

CO2 SHAKING INCUBATOR

MODEL : NB-206CXL/206CXXL

N-BIOTEK

Leading Life science

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1. INTRODUCTION

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

This operation manual includes 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.

W A R R A N T Y

Item	Anicell	**Model**	NB-206CXL / NB-206CXXL
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. NBIOTEK 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 NBIOTEK when warranty repair is needed.

Signed By

President Daeyong Kim
N-BIOTEK,INC.

2. 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**

2.1 Precaution for electricity

---------- **WARNING**----------

Use this product only internally. (220V, 60Hz)
(If the product is used at the place in different power pressure, it causes a fire and malfunction of the product.)

Do not make the power plug be pressed by back of the product.
(A space between the product and the plug must be 20cm 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 harshly and do not make it to be pressed by heavy products.
(When it is damaged, it can cause a fire.)

Do not touch the power code with wet hands. (It can cause an electric shock.)

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.)

2.2 Precaution for installation

---------- **WARNING** ----------

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.)

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℃ ~ 30℃.)

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

---------- **CAUTION** ----------

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.)

2.3 Precaution for use

---------- **WARNING** ----------

You must not disassemble, fix and remodel the product by yourself.
(You can damage the product throughout a fire and malfunction or get a loss from a different study result than the original purpose)

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

Be careful to use inflammable substances such as benzene, thinner, alcohol and LP gas
(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 towel
(It can cause a fire and an explosion.)

Do not disassemble the shaker during the product is operating

---------- **CAUTION** ----------

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.)

2.4 Precaution for ground connection

----------  **WARNING** ----------

■ 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 elect 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 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.

3. FEATURE & SRECIFICATION

3.1 FEATURES

● SUSPENSION CELL 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 the CO2 uniformity.

● EXCELLENT TEMPERATURE CONTROL

6 Sides Direct Heating with P.I.D control provides uniform temperature distribution and fast heat-up & recovery time. Forced air circulation fan locates at the top of the chamber and it 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.

● SPLIT INNER GLASS DOOR

3 glass inner doors allow minimizing the loss of inner temperature, CO2 density, humidity when opening door.

● UV LAMP

It is located above ceiling in chamber and decontaminates air circulating from the fan.
(This mode is selectable and can be off by switch)

● ANTI-BACTERIAL FILTER

Built-in antibiotic filter at the top of the FAN filters air and provide the clean air the inside of chamber.

● AUTO RESTART

When the inner door is opened, the shaker stops operation automatically, and operate again when the door is closed.

● INDIVIDUAL SHAKER CONTROL

Able to control 3 shakers separately, so 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

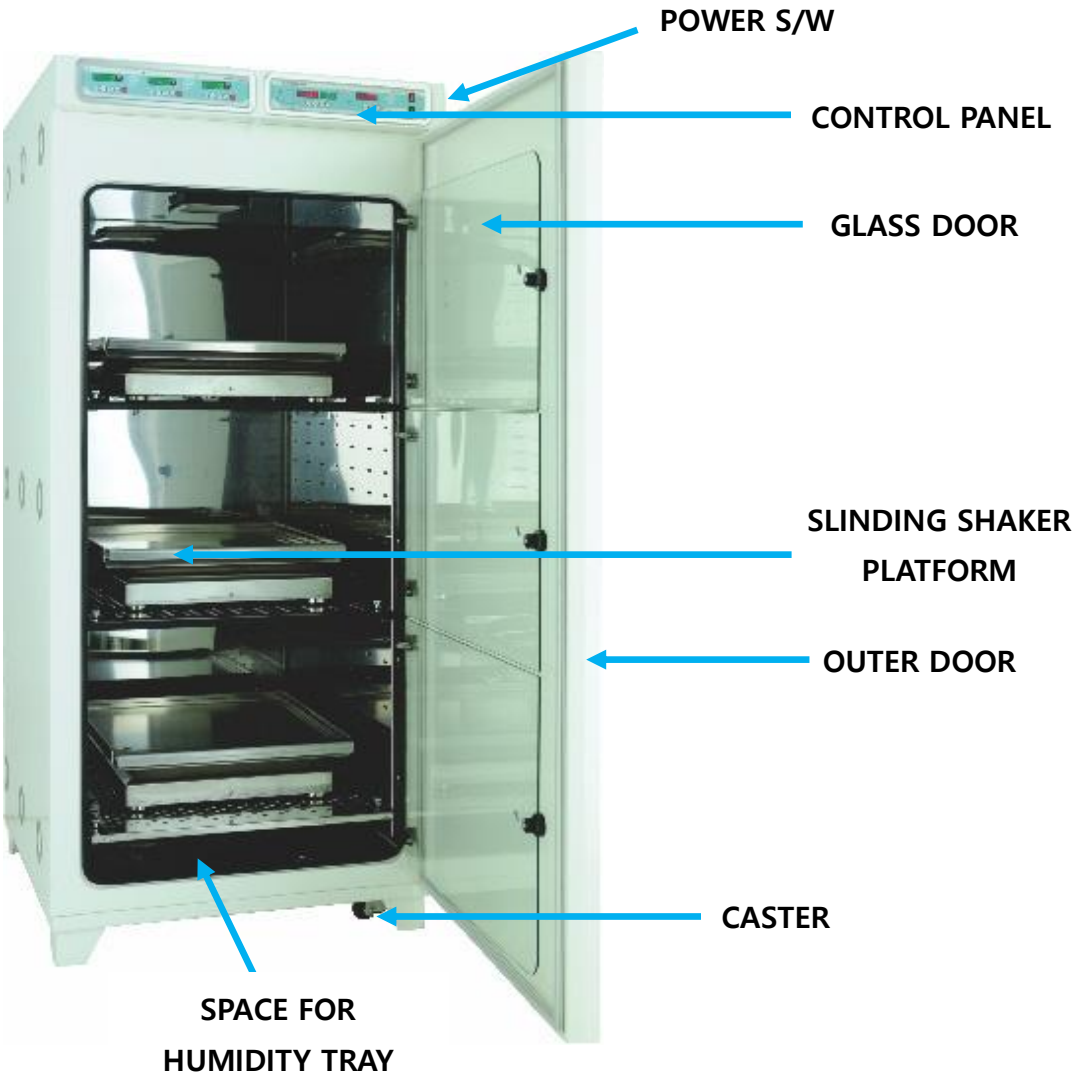
This product is designed properly to a GMP facility, because it is never rusted through all-stainless composition.

For Brief Introduction on UCC, visit our Youtube Channel
https://www.youtube.com/user/NBIOTEK

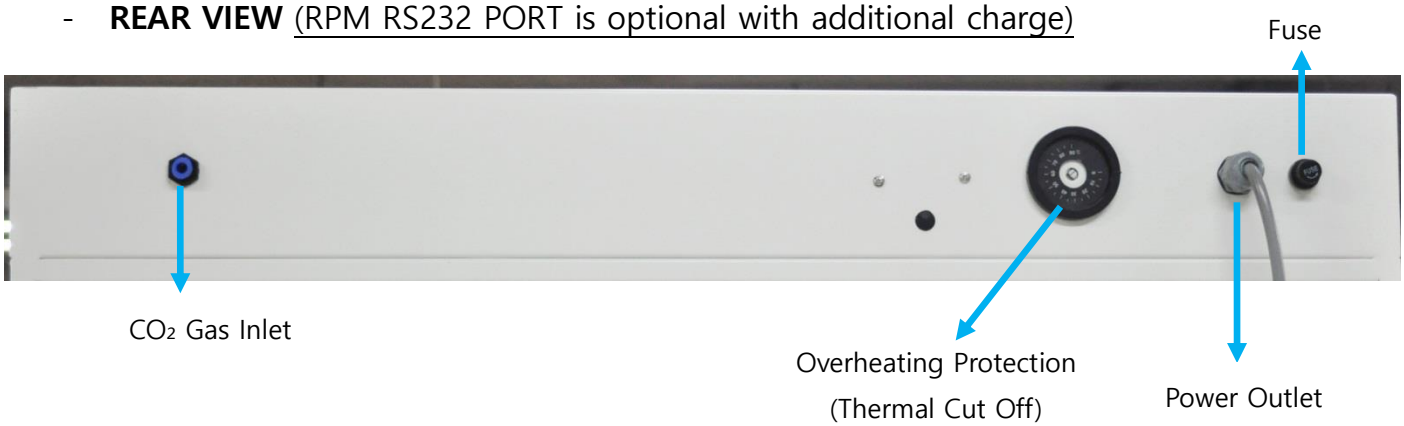
3.2 SPECIFICATION

INCUBATOR	NB-206CXL	NB-206CXXL
Temp. range	Ambient +5℃ to 60℃	
Temp. accuracy	±1℃ at 37℃	
Humidity	≥70% at 37℃	
CO_2 range	0 % to 20 %	
CO_2 accuracy	±0.3 % at 5 % at 37℃	
CO_2 sensor	IR CO_2 sensor	
CO_2 inlet pressure	0.7 ~ 1 bar	
Out door	Silicon Packing Magnet Door	
Inner door	Each Inner Door of 3 Shelves	
Display	LED Display	
Jacket type	Air Jacket Type (6 sides heating)	
Filter	Anti-Bacterial Filter	
Sterilization	U.V 4W x 1ea	
Chamber volume	650 liter	850 liter
Shelves	3ea	
Chamber dimensions	700(W) x 650(D) x 1430(H) mm	700(W) x 800(D) x 1530(H) mm
Each compartment dimensions	Compartment 1(Bottom): 700(W)x650(D)x430(H)mm Compartment 2, 3(Middle, Top): 700(W)x650(D)x380(H)mm	700(W)x800(D)x410(H)mm
Overall dimensions	820(W) x 780(D) x 1740(H) mm	820(W) x 920(D) x 1840(H) mm
SHAKER	**BUILT-IN SHAKER**	
Motion	Orbital	
Speed range	30 to 200 rpm	30 to 250 rpm
Speed accuracy	±1 rpm	
Time range	Continuous or up to 99h 59min	
Time accuracy	±1%	
Motor	Plate Type B/L DC Motor	
Drive system	Beltless Direct Drive	
Orbit diameter	25mm	
Platform size	520(W) x 520(D) mm	
Dimensions	465(W) x 540(D) x 125(H) mm	
Weight	323kg	393kg
Power	110/220V, 50/60Hz	

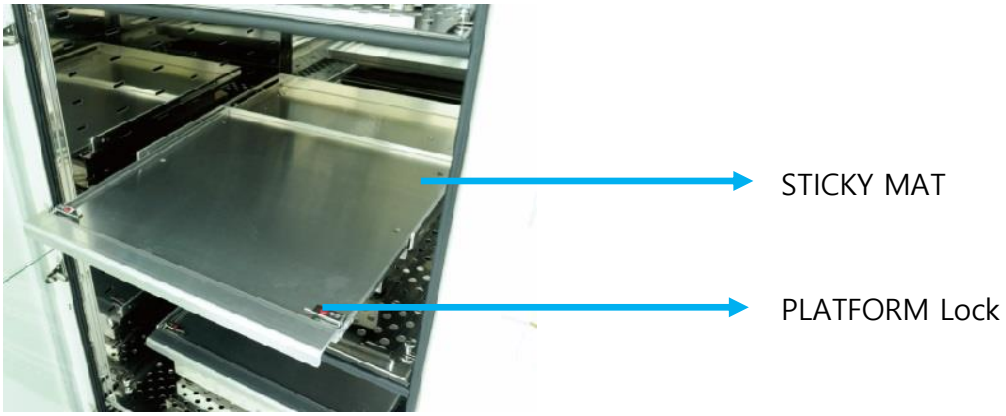
3.3 CONFIGURATION



- **REAR VIEW** (RPM RS232 PORT is optional with additional charge)



- **SLIDING Platform**



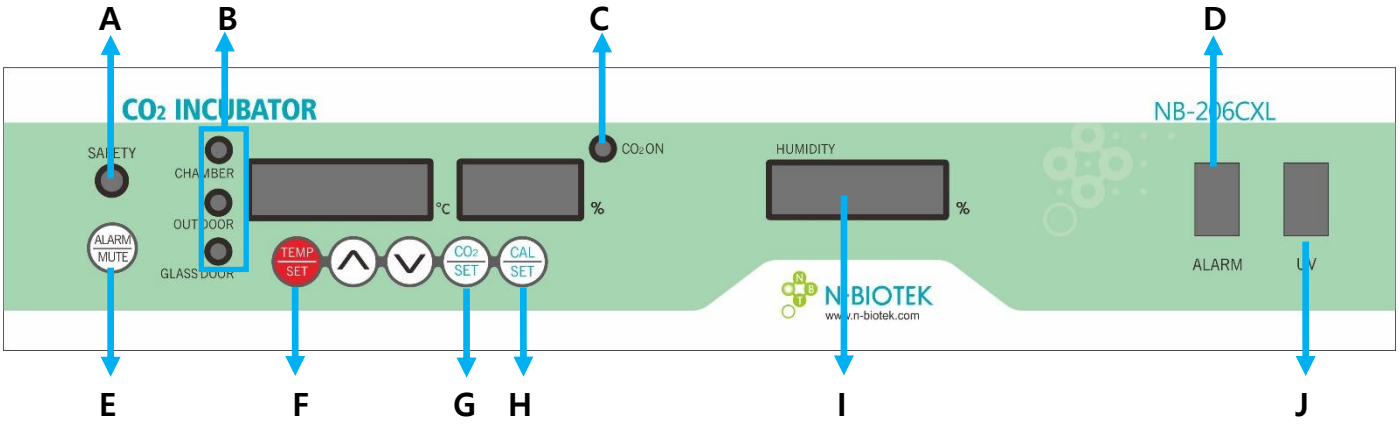
- **UV LAMP**

UV lamp near circulation(humidity) fan works for sterilization even during cell culturing.
It is covered by the fan sealing of chamber so, it doesn't have a danger of contamination and effect to the temperature of chamber.
It can be turned on and off by its S/W under the Alarm S/W

4. INSTALLATION & OPERATION of Incubator

4.1 Control Panel

-CO_2 INCUBATOR CONTROL PANEL



A	**SAFETY SIGNAL**	Over Heating Protection Activated Alarm
B	**HEAT-OPERATING SIGNAL**	When Heater make heat "red" light on.
C	**CO_2 SIGNAL**	When CO_2 valve open and inject CO2
D	**ALARM S/W**	Audible Alarm ON/OFF
E	**ALARM MUTE**	Temporary stop of Audio Alarm
F	**TEMP. SET**	Temperature Set-up
G	**CO_2 SET**	CO_2 Set-up
H	**CALIBRATION SET**	Calibration Mode
I	**HUMIDITY CAL. SET**	Humidity Calibration
J	**UV S/W**	UV Lamp ON/OFF

4.2 Installation

1) Locating

1) Place and install the product

Install the product at the desired place and check the level of both side and back and four castors. Move the product to the desired place.

After placing the product at the desired spot, all of 4 casters need to be locked to avoid vibration of incubator. To get it down to ground, turn it count clockwise.

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

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.

▶ 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 to 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 at 1bar.

The pressure gauge may be different depending on its manufacturing companies.

If Regulator's pressure is too high, it causes malfunction of the CO_2 valve control.

4.3 Operation

1) 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.

Temp. Display

CO2 Display

2) CO2 Set-Up

a. Press the “CO_2/SET” button and then, the LED screen will flicker and show current programmed temperature.
b. Adjust value of display by UP(▲) and DOWN(▼).
c. At last, press “CO_2/SET” button to end set-up and if it shows “SAVE”, it means that it correctly has been programmed.
d. After complete set-up, CO_2 control valve immediately open and CO_2 gas is injected to chamber. The pilot lamp of CO_2 shows valve control. At open position, it shows red light.

3) TEMPERATURE SETTING

a. **Turn on the Power S/W.** Then, the LED screen will display the temperature in the chamber.
b. **Press the "TEMPSET" key**, Then, the LED screen will flicker and display.
c. Then, **input the desired temperature by pushing UP (▲) and DOWN (▼).**
d. **Press "TEMP/SET" key again** 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.

Caution * 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℃~ 60℃

The maximum temperature resistance of IR CO_2 sensor is 90℃.

4) HUMIDITY

Showing humidity (%) is useful to check real humidity in chamber and to recognize the time for water supplement in tray. For humidification in large chamber, water tray is placed on the bottom. Bottom heater warms up the water in the tray and it provides moisture naturally.

Humidity is not controllable manually. Display only!

4.4 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.

Caution

Measure CO_2 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.

No.	DISPLAY	FUNCTION
1		Chamber Temperature
2		Out Door Heater Temperature
3		Glass Door Heater Temperature
4		CO_2 Calibration
5		Heating control
6		CO_2 gas supply control
7		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 (▲) 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 available range of temperature is ±5℃

* To go to next channel is to press "CAL/SET" button. After complete setup, the LED is back to temperature display.

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

Caution

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

Caution

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 calibrating CH2, try to calibrate

d. 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%.

e. Fifth Click "CAL SET" ☞ Heating control

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

Push UP (▲) and DOWN (▼) 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.***

Push UP (▲) and DOWN (▼) to set the value

NOTE

Channel 6 is to set starting point of solenoid control for CO2 supply.

Factory pre-programmed set point is at 1 (2 for NB203XL, 3 for NB203) to optimize set-up at 5% and it means that CO_2 control valve is in open position until the CO_2 density reaches to 4%. From 4% of CO2 to setting value, solenoid valve takes control of CO_2 supply until it gets to setting value.

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

Please follow up the procedure for calibration below in case of discrepancy between actual values (measured by reliable thermometer or CO2 analyzer) in chamber and display.

4.5 Overheating Protection

This is the safety device preventing temperature over caused by the malfunction in heater. The accuracy of this thermal cut-off is ±5℃. Hence, set the temperature of this cut-off higher 5℃ than the programmed temperature.

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

■ EX) If the setting temperature is 37℃, set SAFETY S/W in the rear of the product at about 42℃. 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℃ higher than set point.

■ It is set at 42℃ when the product is released from the factory, but it may be changed during transportation of the product, so please check it before temperature set-up.

■ SAFETY S/W is the safety equipment that prevents over heating caused by a malfunction of temperature control.

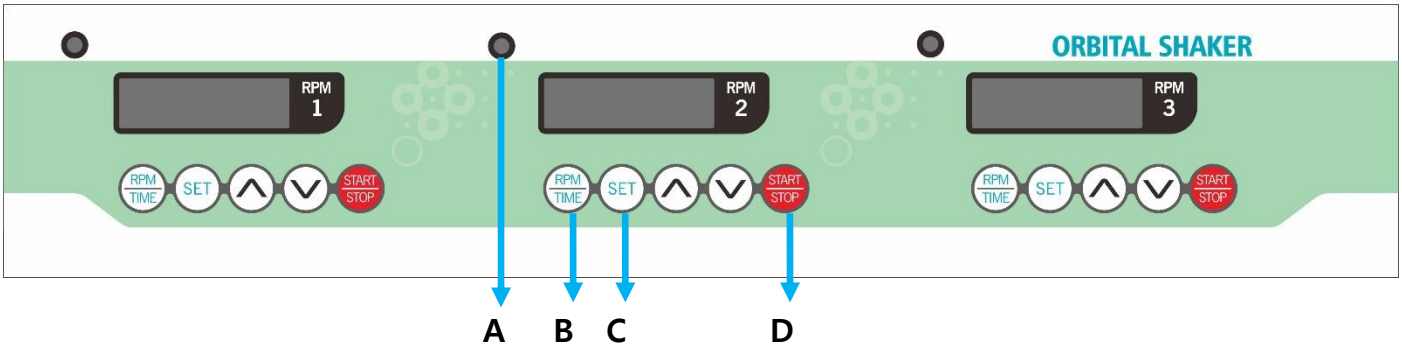
Caution

In case that temperature is not able to heat up to set point, check this out.
Once it is activated and cut the heater, the pilot lamp of it is lighted in red.

5. SHAKER OPERATION

Anicell™ allows controlling 3 shakers individually through each control panel.

- Shaker Control Panel



A	**SHAKING SIGNAL**	Indication when shaker is running
B	**RPM/TIME**	RPM, TIME Mode to switch RPM and TIME
C	**SET**	To set and save RPM or TIME
D	**START/STOP**	Shaking Start/Stop

1. RPM Setting

a. After the time setting is completed, **press the "RPM/TIME" button** 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, **press the "SET" key** again then, the screen displays **"r SAVE"** as below

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

Caution You must **press the "SET" key** to save.

Caution 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.)

2. Time Setting

a. When you **turn on the "Power S/W"** 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 **pressing "(UP)▲(DOWN)▼" keys** and after setting the hour, you can set the minute through the same way with setting the hour.

d. **Press the "SET" key** after setting the time (hour and minute), then the screen displays "**t SAVE**" as below.

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

Caution 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.**

Caution The RPM range is 30 to 200RPM within maximum loading of flasks shown in table of load capacity below.

3. Maximum loading for 3 shakers

The volume of flasks	Maximum number of Flasks
100ml Flask	MAX. 156 EA
250ml Flask	MAX. 90 EA
500ml Flask	MAX. 60 EA
1000ml Flask	MAX. 48 EA
2000ml Flask	MAX. 9 EA (Total 27 EA in NB-206CXXL)

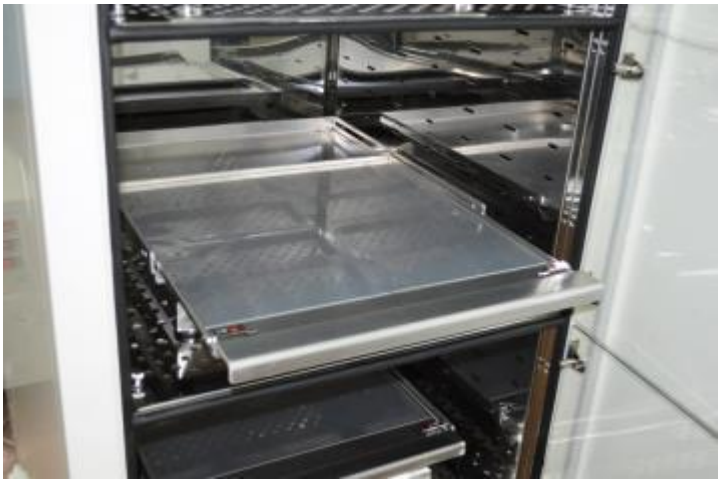
※ This Maximum number of flasks is based on using sticky mat on all 3 shaker platform.

※ With maximum loading, shaking is available up to 150RPM.

※ In case of NB-206CXL, **2L Flask is only available in 3rd compartment(lowest level).**
Other top and middle compartments are not available with 2L flask due to the height.

Caution If more flasks than the maximum capacity are mounted on the platform, the shaker might not work well at the programmed RPM. In this case, remove some flasks or lower RPM until it works well.

4. Sliding Platform



Caution Push the red button at each side of front and slide it out to front.
Carefully slid it out to avoid flasks fallen down from platform.
Watch your hands not to be inserted in between sliding platform and base platform.

NOTE : The door is with Magnetic so it attaches and holds on the outer door. It makes user be free to handle inside shaker and sample, etc. Be sure to attach the knob of glass door on outer door before handling shaker or culture container.

5. Shaker Disassemble for Cleaning

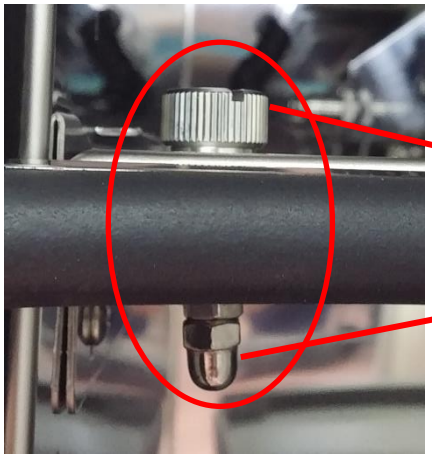
When the product requires cleaning chamber and shakers,
It is hard to access all surface of chamber without removal of shakers and shelves.
3 shakers in Anicell and its base shelves are all demountable.

Followings are the step to disassemble shakers and shelves.

- **Ensure** the product is turned off completely.
- **Unplug** the shaker cable connector at the back of the chamber. (#Photo 1)
- **Unscrew** two bolts on the front of each side corner in shelf. (#Photo 2)
- **Pull out** the shelf carefully

NOTE: If you need to take the shelf out fully, unscrew thumb screw and bolt.

#Photo1 #Photo2



While holding thumb screws with tool, unscrew the hexagon nuts with spanner or proper tools.

6. ALARM

Alarm warns audibly in case of door open, fault of temperature & CO_2 gas.

To activate Alarm sensing, place alarm S/W at "On".

1. Door Alarm (short beep sound / Beep Beep Beep)

- Alarm occurs when the outer door is open for longer than a minute.
- Alarm stops in 2.5 seconds after the outer door closed.
- Once alarm mute is pressed, alarm stops immediately and 10 minutes delay will be given.

*** If outer door is still open, the alarm will activate every 1 minute even if you press alarm mute.**

2. Temperature Alarm (short beep sound / Beep Beep Beep)

- Temperature Alarm sensing program starts when chamber temp. maintains in ±1℃ from the set point for more than 3 minutes.
- If temp. deviation is more than ±1℃ from set point for about 8 minutes, alarm starts ringing. So, temp. alarm tolerance delay is about 8 minutes.
- When you press alarm mute during alarm ringing, alarm immediately stops and 10 minutes alarm delay will be given.
- If temp. deviation is still more than ±1℃ after 10 minutes alarm delay, audible alarm will be activated again, unless pressing alarm mute.
- About 1 minute after the temp. is within ±1℃, the alarm automatically stops.

3. CO_2 Alarm (long beep sound / Beep----------)

- CO_2 Alarm sensing program starts when CO_2 range maintains in ±1% from the set point from more than 3 minutes.
- If CO_2 deviation is more than ±1% from set point for about 8 minutes, alarm starts ringing. So, CO_2 alarm tolerance delay is about 8 minutes.
- When you press alarm mute during alarm ringing, alarm immediately stops and 10 minutes alarm delay will be given.
- If CO_2 deviation is still more than ±1% after 10 minutes alarm delay, audible alarm will be activated again, unless pressing alarm mute.
- About 1 minute after the CO_2 is within ±1%, the alarm automatically stops.

7. APPREANCE DRAWING