OPERATING MANUAL

LARGE CAPACITY CO2 INCUBATOR

MODEL : NB203QRXXL, NB205QRXXL

- CONTENTS -

1. INTRODUCTION

Thank you for purchasing our MaxCell Giant, Large Capacity Incubator.

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	MaxCell Giant	**Model**	
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**

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. 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 or ducts, cooling source.
(The proper indoor temperature is 20℃ ~ 30℃.)

Do not put inflammable substances near the product.
(It may 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 leveled floor and solid place
(If the ground is not flat, it causes a vibration of the product.)

When you move the product, use the proper tools and pallet trolly. As instrument is heavy and big but, with no caster at bottom of incubator, at least 3 people are required for movement. Hold both left and right side to prevent falling it down when it is transporting to somewhere.

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.

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.

3. FEATURE & SRECIFICATION

3.1 Feature

● Large Capacity

This incubator is big enough to accommodate a full 10decks of roller apparatus and maximum 35 shelves inside chamber. This large capacity allow some shaker or stirrer, rocker can be placed in inside CO_2 incubator.

● Excellent Temperature Uniformity with smart Airflow Control

Despite big chamber size, temperature is very uniform at any part of inside chamber thanks to 5 side direct heating method and 4 circulations fans which make vertical air flow from up to down. Also, there is air duct where air goes through circulation fan from down to top. This structure spread air to entire chamber and finally makes temperature to be uniform.

● 5 Side Direct Dry Heating

Except Door, all chamber are surrounded with heating wires and heat is generated from all 5sides of chamber. This maximizes temperature uniformity.

● Rail for big Roller Apparatus

To place big and heavy roller apparatus inside chamber, the bottom of chamber is flat and railway is placed to locate roller apparatus easier on the bottom chamber.

● Glass Window for clear view.

Located wind in glass window allow user to view inside clearly to check the situation inside.

● Dual Beam IR CO_2 Sensor

It detects CO_2 density precisely regardless of affection from environment change.

● Stainless Steel Chamber and Shelves

All material of chamber and shelves is made stainless steel and it minimize corrosion and contamination. It is also easier to make cleaning inside chamber.

● 6 Interior Outlet

Installed 6 Interior outlets allow user to place some electric device or equipment inside chamber.

● Two Fuse for electric safety

To prevent incubator from shouting down by electric overloading from electric devices inside, this incubator is equipped with two separate fuses. One is for incubator and another is for interior outlet. With this system, electricity of incubator is not fused even if some electric overloading from interior outlet is happened.

● Sliding out Control Panel

Considering high position of control panel, control panel is able to be sliding out from its position. This allows engineer to check and repair some control parts at comfortable position.

● Optional Analogue Output for Temp, CO_2, Roller Apparatus

4-20mA analogue output port is available to add as chargeable option. Also, there is analogue output connector line at lower back part for the analogue contact line from the roller to port.

3.2 SPECIFICATION

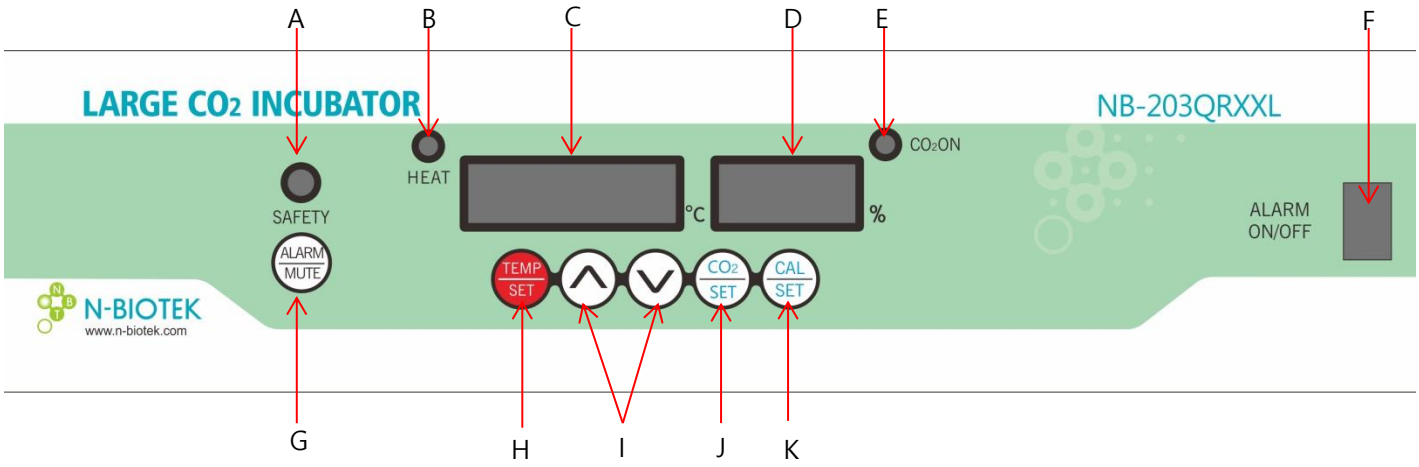
Model	NB205QRXXL(Non-CO_2)	NB203QRXXL
Temperature Range .	Ambient +7ºC ~ +60ºC at 25℃ RT	
Temp. Uniformity	Temp±0.5ºC ~ ±0.7ºC at 37℃ and 25℃ RT	
Temp. Increment	±0.1ºC	
Temp. Recovery*	12 minute at 37℃ after door open for 5minutes	
Heating	5 Side Direct Heating with Forced Air Flow by 4 Circulation Fans	
Temperature Safety	Independent Over Temperature Thermostat	
Interior Outlet	Same voltage of instrument/ 7 outlets(standard)	
Display	digital display, 5 Digit LED for Temp, CO_2	
Number of Shelve	Optional, Max 35ea	
Door	Front door (left open)with Viewing Glass Window	
Electric Safety	Fuse 15A for Incubator / Fuse 10A for Interior outlet	
Interior Dimension	867.6(W) x 720(D) x 1927.3(H)mm	
Exterior Dimension	990(W) x 855(D) x 2123.5(H)mm	
Chamber Capacity	42.5 cu ft /1204L	
Chamber Material	Stainless steel 304	
Power Supply	100V or 120V or 220V / 50 or 60Hz (670W)	
CO_2	n/a	0 ~ 20%
Sensor	n/a	Dual Beam Infrared Sensor(IR)
Accuracy	n/a	±0.1% at 5%
Alarm	Temperature, Door Open	Temperature, CO_2, Door Open
Analogue Output	Temp, Alarm Contact, Roller Alarm Contact	Temp, CO_2, Alarm Contact, Roller Alarm Contact

*Condtion : RT at 25℃ with 3 shelves in chamber. No cell containers or roller appratus inside.
This performance may vary dependaning on condition of surrounding temperature, volume of container in chamber.

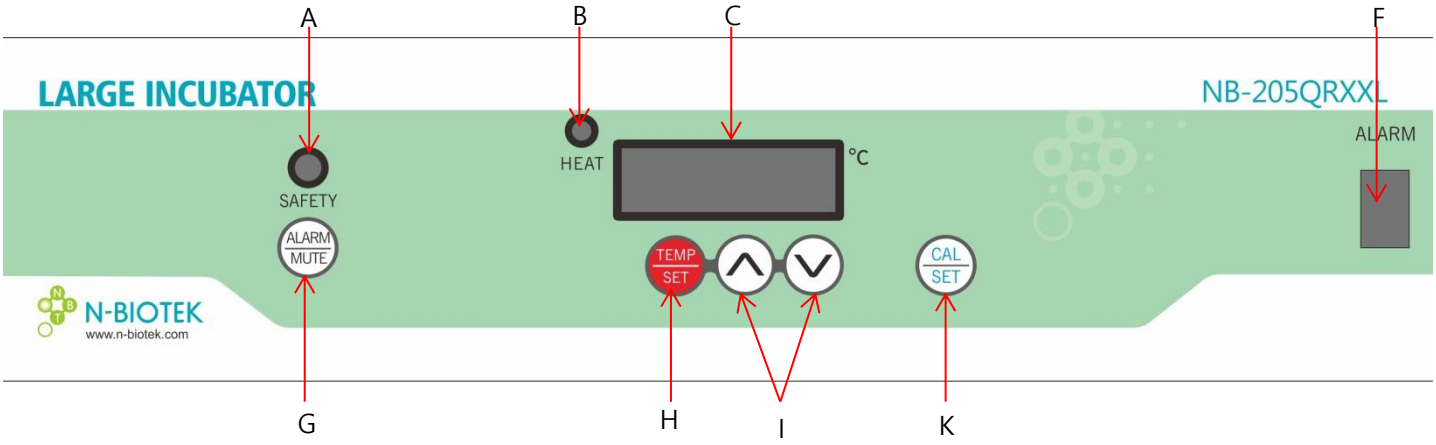
4. CONFIGURATION & INSTALLATION

4.1 Control Panel

<CO_2 Version : NB203QRXXL>



<Non-CO_2 Version : NB205QRXXL>



A	**Overheating Lamp**	Lighting when thermal cut off is activated
B	**Heat-Operating Signal**	Lighting when heating is on
C	**Temperature Display**	
D	**CO_2 Display**	
E	**CO_2 Signal**	Indication whether CO_2 is supplied to chamber or not
F	**Alarm On/Off Switch**	
G	**Alarm Mute**	For Temporary Audible Alarm Delay
H	**Temp Set**	To enter and save Temp Setup
I	**Up and Down Key**	
J	**CO_2 Set**	To enter and Save CO_2 Setup
K	**Calibration**	To enter and Save Calibration

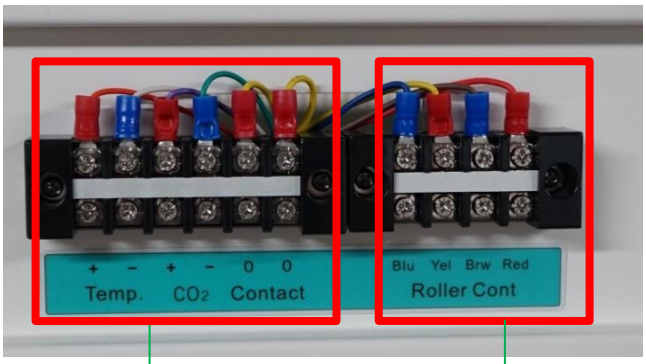
4.2 Configuration

<4 Circulation Fan>

<At Right side of Incubator>

A. Power Switch and Temperature Safety Thermal Cutoff

B. Analogue Output Port(Optional)



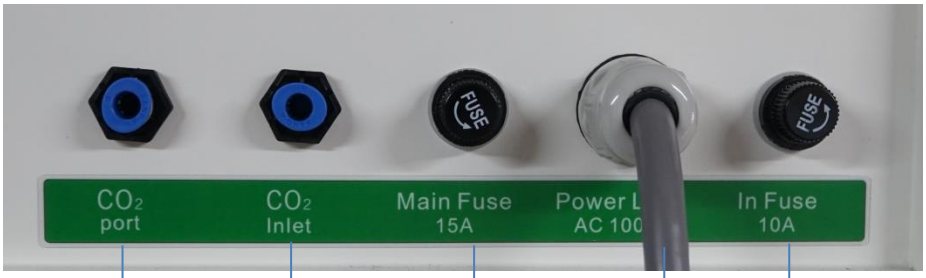
<For NB203QRXXL>

Analogue output port for incubator

Analogue output port for roller

※ For Non-CO2 model(NB205QRXXL), there is no CO2 part on Analogue output.

C. Gas Inlet and Fuse



CO_2 Sample Port

Main Gas Inlet

Fuse for Incubator

Power Cable

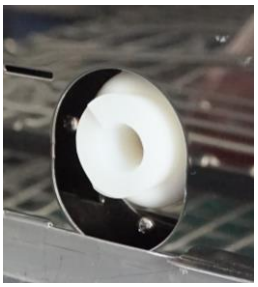
Fuse for interior outlet

(NB203QRXXL Only)

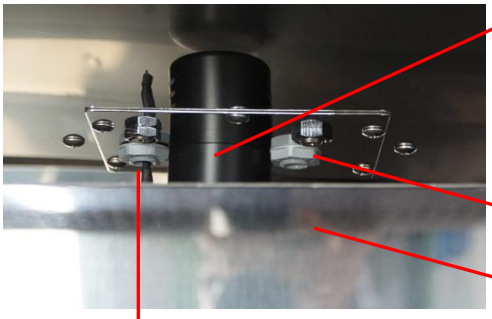
D. Other Parts

<Interior Outlet>

<Access Port>



<Part at Roof of Chamber>



4.3 Installation

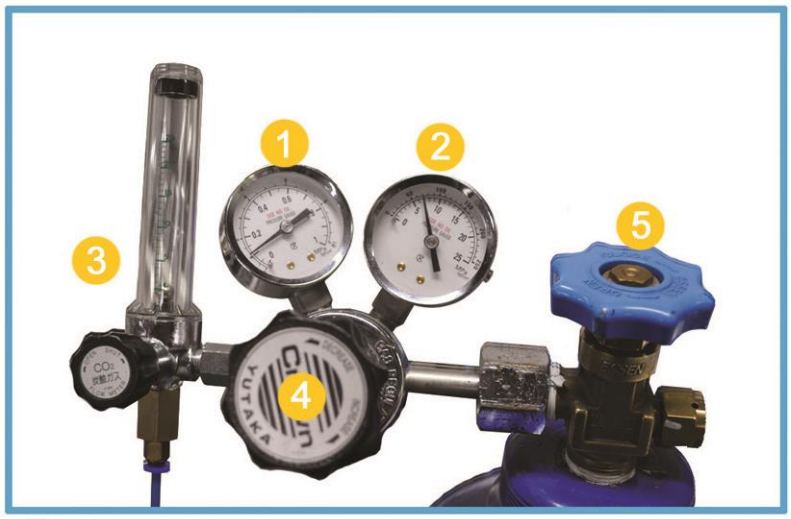
1) Locating

Place the incubator flat floor. Make it leveled with level aligner. When lift or down it, use the car jack lift placing it in supporter at both sides of incubator.

2) Connect the Power Plug

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

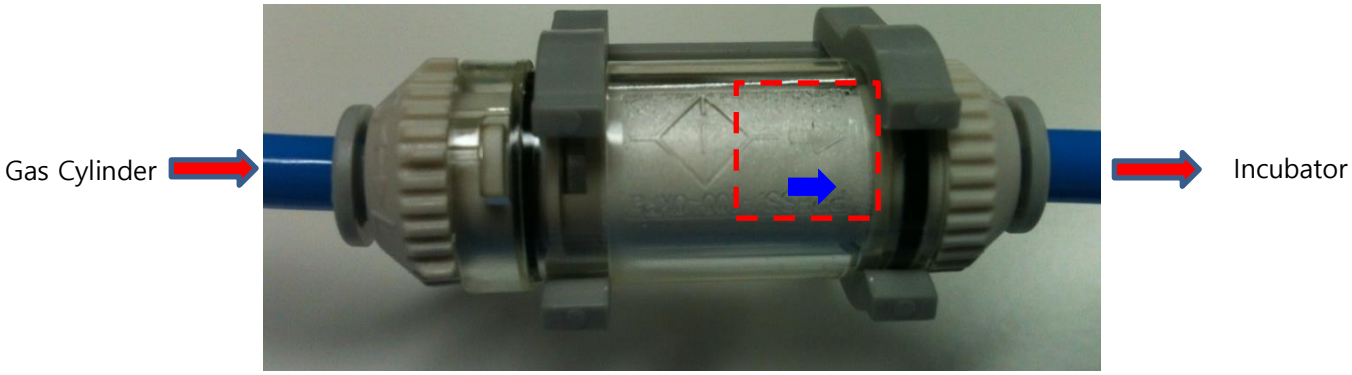
3) Connect the CO2 GAS



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

- Check 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 main valve of gas cylinder(#4) and flow meter. Then, put the hose into the fitting of regulator and put gas tube into the gas inlet at back of incubator.
  Make sure all valve in Regulator and main valve of gas cylinder are close.
  (④ and ⑤ have the opposite lock direction each other. ④ is clockwise and ⑤ is counterclockwise.)
- Open #5(Mast valve of cylinder) and #4(the regulator valve), #3 Flow meter. While Flow meter fully open, do adjust Regulator Valve at **1.5bar(0.15MPa)**. Another regulator valve in line 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 is over than level 2, close the flow meter until the ball is placed lower than level 2.

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



As marked in filter, tube with filter should be connected in between cylinder and incubator.

4) Roller Apparatus Installation

Like photo below, pull the roller apparatus following rail and place the stopper and fix its screw to prevent roller castors coming out. .

Thumb screw of stopper

5) How to lift it up using Hand Jack Lift

Like left photo below, insert hand lack lift underneath of supporter bracket and lift it up or down.

<Lift Up>

<Fix on Ground, if necessary>

If supporter bracket for lift is turned over, it looks like right photo above and it can be used to fix incubator on floor.

Two Hand Lifts must be used at both side of supporter at same time when lifting or taking down it.

5. 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.

Caution If CO_2 recover is too late after door open and close, check the gas pressure of regulator if it is too lower than 1.5 Bar. And also, if CO_2 in display is too higher than set-up and some overshoot of gas is happened, check the gas pressure of regulator. Gas pressure should be less than 1.5Bar.

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 current value will 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℃

* Before Temperature-set-up, ensure safety thermal cut-off(at right side)dial is set at least 4℃ higher than set-up temperature.

The maximum temperature tolerance of IR CO2 sensor is 90℃.

4) TEMPERATURE OVERSHOOT SAFETY THERMAL CUT OFF

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.

6. CALIBRATION

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.

Caution

Frequent calibration may cause unstable control for CO2 gas and Temperature.
Do not use the calibration unless the exact diagnose of deviation using trustful Thermometer and CO gas analyzer is confirmed.

Before Performing Calibration,

Ensure the Alarm button should be “On” position prior to this procedure.
(If the Alarm button is at OFF, the “CAL/SET” button is not activated to start calibration.)

Do not perform the calibration before temperature and CO_2 are stabilized.
Perform the analysis of CO_2 density and Temperature when the incubator has been worked in stable temperature and CO_2 density for more than 1 hour.

<List of Calibration Mode>

No.	DISPLAY	FUNCTION
1		Chamber Temperature
2		Nothing
3		Nothing
4		CO_2 Display Value Calibration
5		Heating On Off control interval time set-up (Factory Set-up mode, Do not regulate it)
6		CO2 solenoid control interval time set-up (Factory Set-up Mode, Do not regulate it)
7		To save calibrated values finally

a. Press and hold “CAL/SET” button for 10 seconds. Then, the LED will flicker like below.

☞ Chamber’s Main Temperature calibration➔ 1 Channel Sensor located at the ceiling of the chamber and near circulation fan. Ch 1 Calibration is purposed to adjust the value of LED display to be shown in accordance with the actual value of Temperature in chamber. Available range of Calibration is ±5℃

Push UP (▲) the temperature value on LED as much as display difference between actual temperature and displayed temperature when actual temperature in chamber is higher displayed temperature. On the other way, press DOWN (▼) to decrease the value of temperature on LED when the actual temperature is lower than display.

Ex) If the temperature in chamber measured by precise thermos meter is 38℃ but, display shows 37℃, conduct calibration of Ch.1 and increase displayed value by 1℃. After this, display will be changed shortly. To shift one channel to next channel, press “CAL/SET” button once.

b. Second Click “CAL/SET” ☞ Just skip this channel away as this channel is nothing.

c. Third Click “CAL SET” ☞ Just skip this channel away as this channel is nothing.

d. Fourth Click" "CAL SET" ☞ CO2 display calibration

Press UP (▲) and DOWN (▼) key to adjust displayed value.

※Calibration at Factory before shipping is done to optimize accuracy at 5% CO2 Set-up. Hence, this mode may not be 0.0 when you enter this mode at first calibration.

Before calibrating this mode, check the deviation between chamber and display with precise CO_2 analyzer. Calibration is recommendable in case that the deviation range is higher than 0.5.

e. Fifth Click" "CAL SET" ☞ Temperature Control Beginning Point Calibration

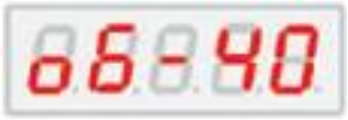
NOTE: CH 5 is purposed to program the starting point of fine adjustment in temperature control.

Factory setting at this mode is 1.0 it means that heating on off control start 1℃ before set-up temperature.

For example, temperature set up at 37℃ and this mode set up at 1.0; on/off control start when temperature reach to 36℃.

※The calibration of this mode is engineer mode which might be required to adjust in case of user's special culture condition or surrounding condition. **Do Not Change it without consult from trained engineer. Wrong set-up in this mode may cause overshoot or slow heating in temp control.**

f. Sixth Click" "CAL SET" ☞ CO2 solenoid control interval time set-up



NOTE : CH 6 is purposed to program the starting point of CO2 gas solenoid valve for fine adjustment.

Factory setting of this mode is 4.0 and it mean solenoid valve for CO_2 inject(valve open and close) start to open and close frequently to make the gas reach to 5% not making high overshoot.

If you set it at 5%, solenoid on off control start once CO_2 reach to 5%.

When CO_2 need to set higher than 5%, this may need to change for fast CO_2 supply.

Do Not Change this mode once too slow CO_2 injection is not confirmed.

Changing factory programmed value may cause high overshoot of CO_2 in its control.

g. Seventh Click "CAL SET" for SAVE

7. ALARM

Alarm warns audibly in case of door open, fault of temperature & Co2 gas.

To activate Alarm detection, turn on alarm S/W.

Alarm detection is activated once temperature is stabilized in ±1℃ of set point for more than 3 minutes.

1) Door Alarm (Beep~~~~~~~~~~~~~~~~~~)

① Audible alarm is activated if door open for more than 1 minute.

② When door is opening for more than 1 minute and audible alarm is being activated,
- If door close during alarm, alarm will stop in 3 second after door close.
- Once alarm mute is pressed, alarm stop immediately and 10 minutes delay will be given.
- If mute is pressed during this door alarm, 1 minute delay will be given as long as door remain open.

2) Temperature (Beep~~~~~~~~~~~~~~~~~~~~)

① Alarm Event : If temperature deviation is more than ±1℃ from set point for 8minutes, audible alarm is activated. So, alarm tolerance delay is 8minutes.

② If mute button is pressed during alarm, Alarm stop immediately and 10 minutes alarm delay will be given. If deviation is still more than ±1℃ after 10minutes alarm delay by mute function, audible alarm will be activated again. So, alarm delay by mute is 10 minutes.

③ If Alarm recover to within ±1℃, alarm will automatically stop.

3) CO2 Alarm (Beep~~~~~~~~~~~~~~~~)

① Alarm Event : If CO2 deviation is more than ±1% from set point for 8 minutes, audible alarm is activated.

② Pressing mute will make alarm stop immediately and 10 minutes delay will be given. If deviation is still out of tolerance after 10miutes delay, alarm will be activated again.

③ Alarm will stop automatically once CO_2 is recovered to within ±1%.

4) Sensor Error Alarm (Sound : Beep ~~~~~~~~~~~~~~~~)

① Alarm Event : In case that temperature sensor or CO_2 sensor are failed to detect correctly by the cause such as failure of sensor itself or disconnection of sensor wire, audible alarm come out shortly when it is detected.

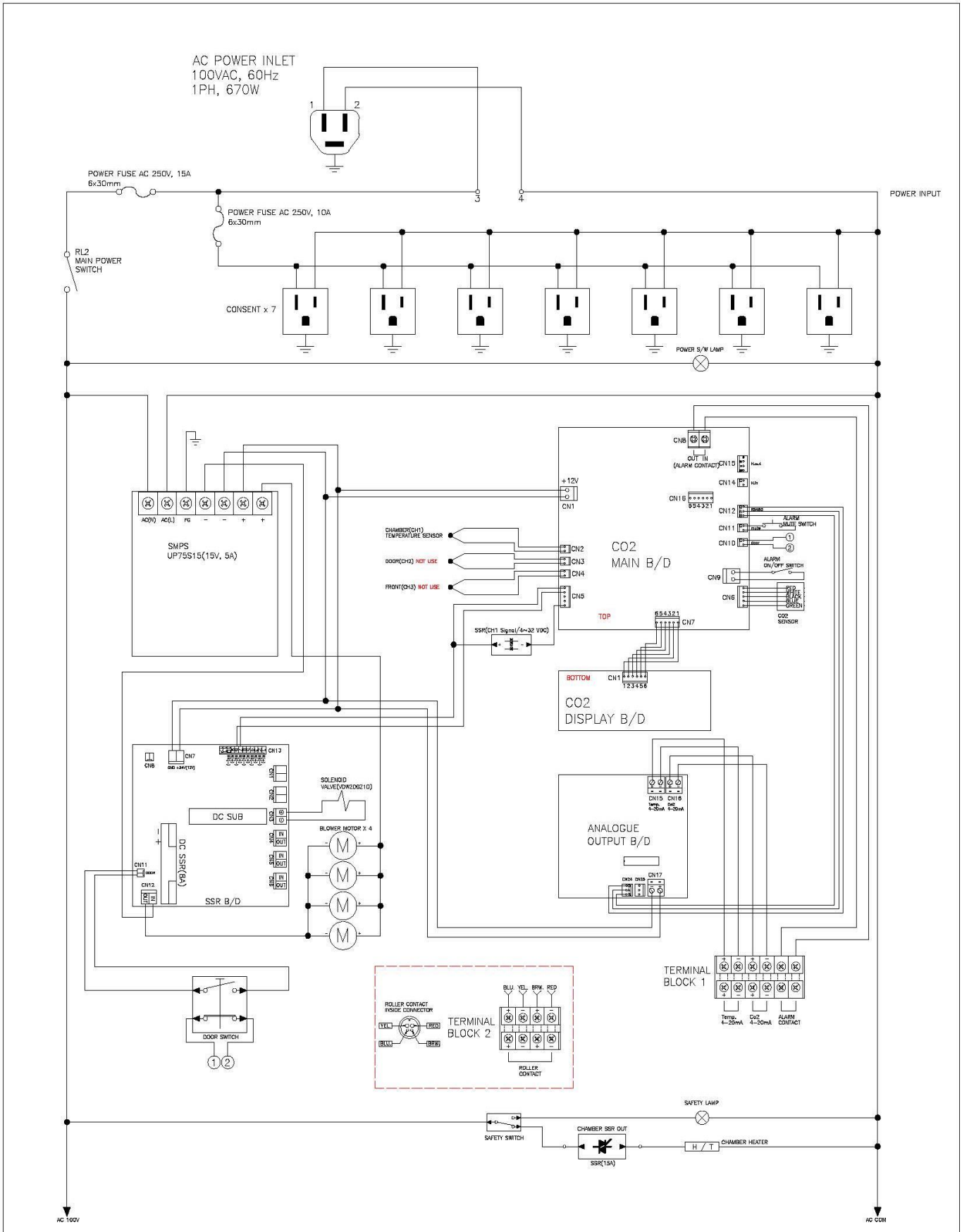
② If this event happed during other alarm event, existing alarm will continue ignoring sensor alarm. In this case, failure can be noticed by strange reading in display of failure part.

③ To stop this alarm, reset the incubator power or turn the alarm s/w off. Mute button is not able to delay this alarm.

④ If the cause of failure in sensor is fixed, alarm is not resumed after reset of power

※ When sensor is failed or disconnected, alarm sound and display are as followings.
Temp Sensor Failure – Display ➔ Errt.1 / Sound ➔Bee~~~ continuously unless turn power off.
CO2 Sensor Failure – Display ➔ Er.C / Sound ➔Bee~~~ continuously unless turn power off.

8. WIRING DIAGRAM

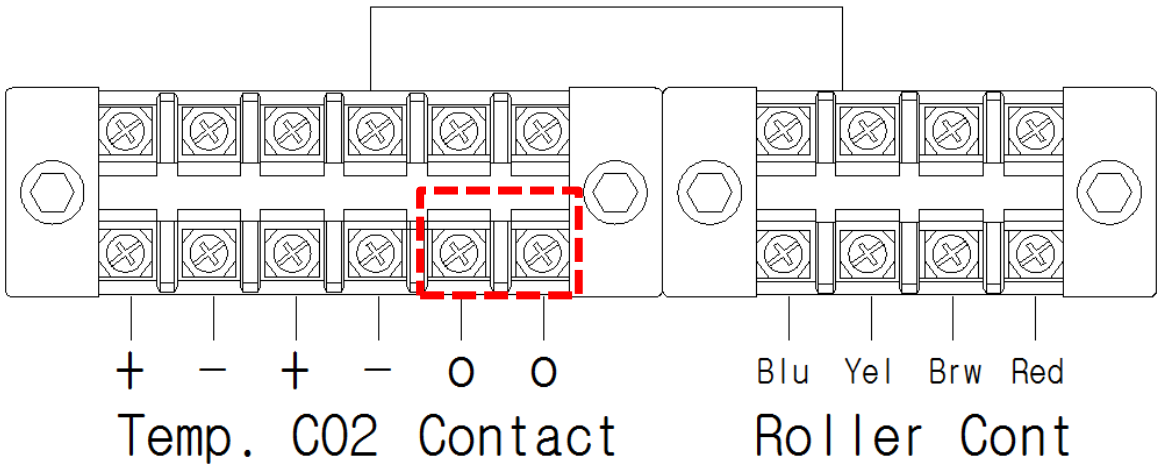


MODEL		WB-203QRXXL			
DESIGNED		DRAW NAME	ELECTRICL WIRING	DATE	2015.8.3
CHECKED		DRAW NO.	1508W203QRXXL-1	REV.	1
APPROVED		SCALE		SHEET	1/1

APPENDIX I (Analogue Output Option)

1) ALARM CONTACT : Normally NC(Normal Close)

※Connect output wire pins here in red square.



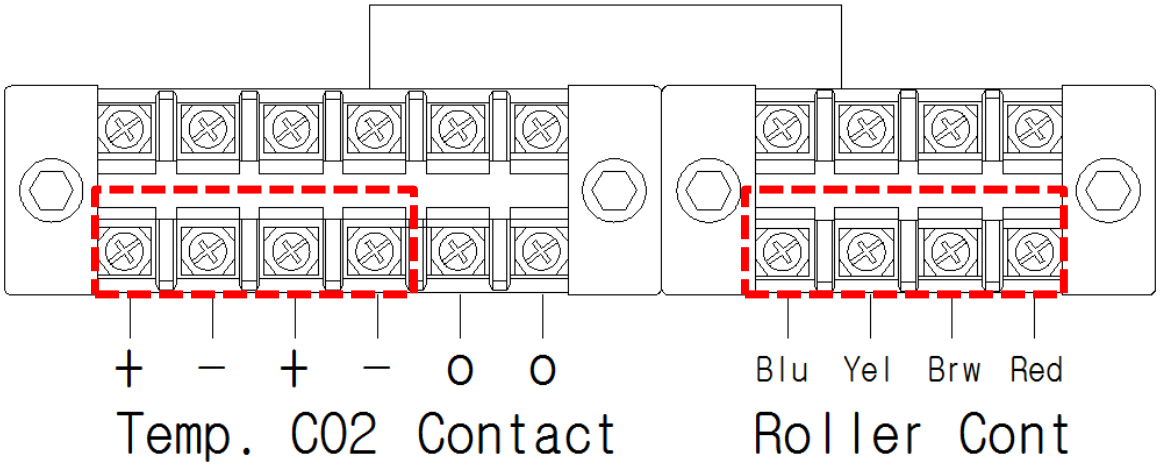
① Contact Capacity : 1A 120VAC, 1A 24VDC

② Activity : Dependent on alarm sounds pattern, contact point will be either open or close.

※In case of periodical alarm like beep—beep--beep, NC(Normal Close), NO(Normal Open) is repeated but, in case of one pattern alarm like beep~~~~, Normal open will continue until alarm is disarmed.

2) Analogue output

※Connect wires from proper device to desired part of output port.



Incubator 4-20mA Connection

Roller Analogue Output Port
4-20mA Connection

※ For Non-CO2 model(NB205QRXXL), there is no CO2 part on Analogue output.