

OPERATING MANUAL

Stackable Incubator Shaker

<NB-205QM, QMC>



(Version 1.)

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Thank you for purchasing our Shaking Incubator.

This operation manual describes practical information such as performance, usage, and cautions and notices for use of the product. Prior to using the product, please read it carefully all the safety instructions described in this manual and keep this manual near equipment.

WARRANTY

ITEM	Stackable Incubator Shaker	MODEL	NB-205QM NB-205QMC
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 N-BIOTEK or reliable distributor's examination.
2. The warranty period is 1 year from date of installation or 18 months 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.

For any inquiry, feel free to contact as followings:



N-BIOTEK International Sales Team

Tel : +82-32-321-2100 / E-Mail : export@n-biotek.com

www.n-biotek.com

1. SAFETY AND 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.

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





■ Other Marks

						
Warning	Caution	Compliance	Prohibition	No disassemble	Remove plug	Ground

1.1. Precaution for electricity

-  Use this product in the correct electricity condition matching voltage and Hz marked in serial label.
(If the product is used at the place in different electric condition, 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.)
-  Clean the power plug with soft dry clothes and connect it properly.
(Foreign substances or unsafe connection can cause an electric leakage or something.)
-  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 electric leakage or fire.)
-  Do not handle the power cord with wet hands. (It can cause an electric shock.)
Do not use the damaged power cord 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 cord and stop using it.
(It can cause an electric shock and a fire.)

1.2. 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.)
-  Do not install at a high humid place.
(It can cause affection to electric part and promote a corrosion to the product.)
-  Keep this product out of the direct ray of sun and do not install at a hot place or a environment that is near an electric heat from other instrument. (The proper indoor temperature is 20 °C ~ 30 °C.)
-  Do not put inflammable substances and spray near and into the product except alcohol for cleaning.



The product requires the distance of at least 50 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 the product 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.)

1.3. Precaution for use



Trained and authorized technical service engineer is required to disassemble, fix and remodel the product.



Be careful to use inflammable substances such as benzene, thinner, alcohol and LP gas near incubator.



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 when the incubator or shaker is operating.



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 electric 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.)



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

2. FEATURE & SPECIFICATION

2.1. Feature

1. Suitable size for table top and double deck stacking
2. Easy-Simple-Safe stacking kit allow double deck stacking in short time easily
3. Stable shaking and low noise by BLDC Magnetic Induction Drive Motor
4. Effective Peltier cooling(NB-205QMC only) down to 15°C at 25°C(RT)
5. Reversible door enable to switch open position of door
6. Tempered pair glass window and inside LED lamp help to view inside clearly
7. Automatic shaker stop and internal lamp lighting when door open
8. Reversible shaker mode platform enable reciprocating motion
9. Various holders, tube rack, micro plate rack available (Separate purchase)

All accessories of NB-101S shaker is available in this shaker.

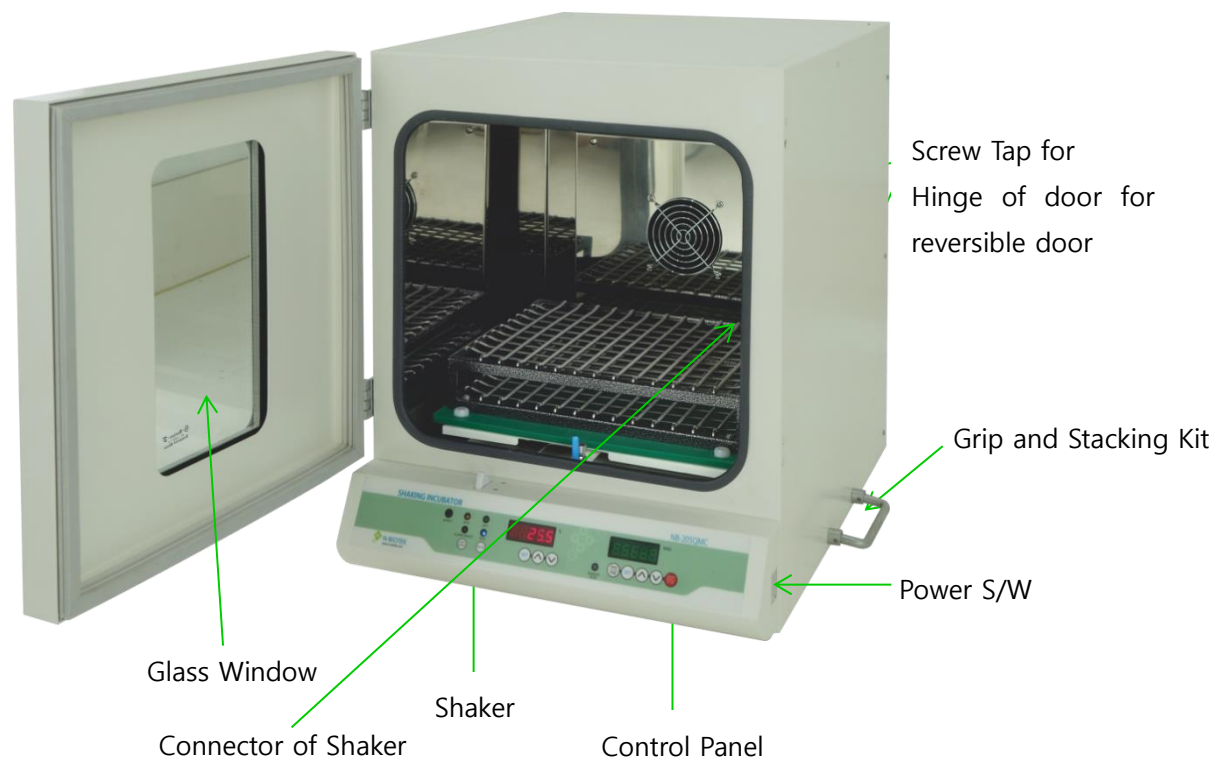
2.2. Specification

Model	NB-205QMC	NB-205QM
Temperature Range	+15°C ~ +60°C at 25°C RT	RT+5°C ~ +60°C at 25°C RT
Temp. Control Accuracy	±0.5°C(*1)	±0.5°C (*1)
Heating / Cooling	Peltier element (72W x 3)	Heater (300W), Cooling Not Available
Circulation Fan	1ea (at center back of chamber)	2ea (at back of chamber)
Temperature Safety	Safety Thermal Cutoff (Accuracy ±5°C)	Safety Thermal Cutoff (Accuracy ±5°C)
Internal Lamp	4W LED	4W LED
Operating Temperature	+5°C ~ +35°C	+5°C ~ +35°C
Display	Digital Display, 5 Digit LED	Digital Display, 5 Digit LED
Shaker	One Mini Shaker Built in	One Mini Shaker Built in
Shaking Motion	Orbital	Orbital
Shaking Speed	30 ~ 300rpm (Upper stacked Incubator up to 200rpm)	30 ~ 300rpm (Upper stacked incubator up to 200rpm)
Orbit Size	22mm (≒1 inch)	22mm (≒1 inch)
Dimension of Platform	300 x 330mm (inside height: 330mm)	300 x 330mm (inside height: 330mm)
Loading Capacity	approx. 4.5kg (1L Flask x 4ea, 2L x 1ea)	approx. 4.5kg (1L Flask x 4ea, 2L x 1ea)
Timer of Shaker	Range: 00h 00min ~ 47h 59min	Range: 00h 00min ~ 47h 59min
Door	Reversible one door with glass window	Reversible one door with glass window
Alarm	Temperature, Door, Shaker Audible and Indicator Lamp	Temperature, Door, Shaker Audible and Indicator Lamp
Programming Function	Auto Stop and Auto Lighting when door open	Auto Stop and Auto Lighting when door open
Electric Safety Device	Fuse (built in with one spare)	Fuse (built in with one spare)
Dimensions	430W x 600D x 550Hmm	430W x 600D x 550Hmm
Weight	approx. 49kg	approx. 49kg
Power Supply	110V or 230V / 50/60Hz	110V or 230V / 50/60Hz
Standard Plate	Base Plate with non-slip rubber mat on shaker	Base Plate with non-slip rubber mat on shaker
*1 → This specification is based on the condition : 37°C at 25°C(surrounding temperature) with no load on shaker		

3. CONFIGURATION

3.1. Configuration

<Photo 1. Front View>



<Photo 2. Back of Incubator>



<Photo 3. Thermal Cut Off & Power Cord Receptacle with Fuse Holder>

Vent Holes: To cool down the heat from Peltier elements and some other electric parts

3.2 Stacking

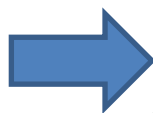
<Photo 4. Two Deck Stacking>



<Photo 5. Locked with Stacking Kit>



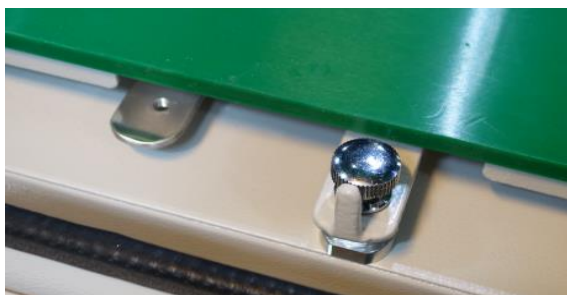
Turn top cover over and fit it into the frame at top of incubator.



Tighten two screws at back side (red circled). Then, mount an incubator above on this part.

Stacking kit are fixed on the floor of this part. Once you open the above cover, you can find two kits with its screw tighten. Install the stacking kit like Photo 4.

3.3 Reversible Shaking Motion Platform (Optional)



<Photo 6. Reciprocating Motion Type>



<Photo 7. Orbital Motion Type>

3.4. Shaker Connector



<Photo 8. Connector Socket of Shaker>
(At Right and Back of Internal Chamber)



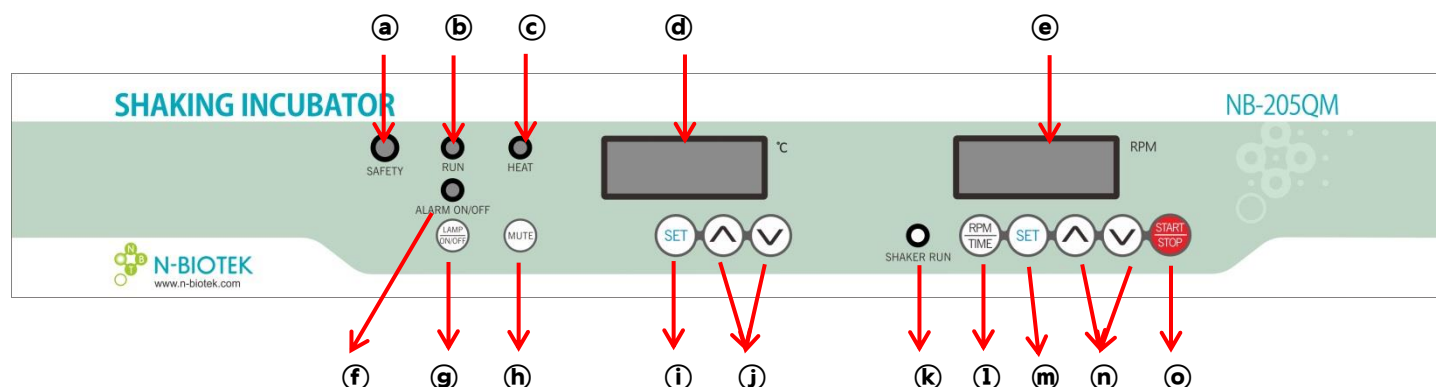
<Photo 9. Female Connector>



<Photo 10. Male Connector>

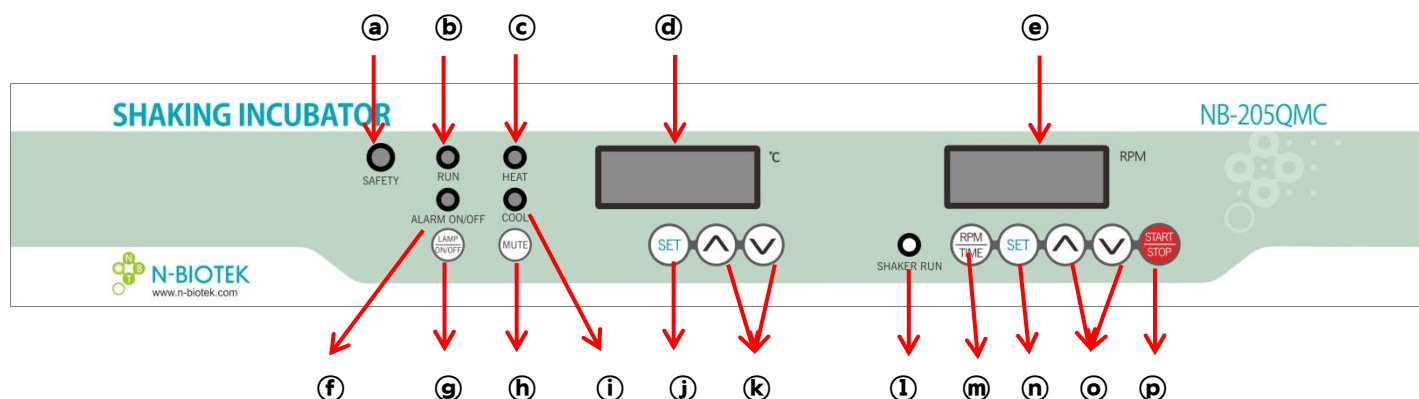
3.5. Control Panel

1) NB-205QM (Heating Only)



	Name	Function
(a)	SAFETY	Indication when Thermal Cut Off Safety is Activated
(b)	RUN	Indication LAMP for the Operation
(c)	HEAT	Indication LAMP for Heating
(d)	°C	Temperature Display
(e)	RPM	RPM Display
(f)	ALARM ON/OFF	Alarm ON/OFF Status: Alarm ON-Lighting off / OFF-Red Light
(g)	LAMP ON/OFF	Internal LED Lamp ON/OFF Button
(h)	MUTE	Alarm Mute Button
(i)	SET(TEMP.)	Temperature Set-up Button
(j)	^	Button for Increasing Value in Temperature Setting Mode
	v	Button for Decreasing Value in Temperature Setting Mode
(k)	SHAKER RUN	Indication Lamp when Shaker is Running
(l)	RPM/TIME	Setting and Display Mode Switching Button for RPM and TIME
(m)	SET(SHAKER)	RPM Setting and Timer Setting Button
(n)	^	Button for Increasing Value in RPM or TIME Setting Mode
	v	Button for Decreasing Value in RPM or TIME Setting Mode
(o)	START/STOP	START or STOP Button

2) NB-205QMC (Heating and Cooling)



	Remark	Function
(a)	SAFETY	Indication when Thermal Cut Off Safety is Activated
(b)	RUN	Indication LAMP for the Operation
(c)	HEAT	Indication LAMP for Heating
(d)	°C	Temperature Display
(e)	RPM	RPM Display
(f)	ALARM ON/OFF	Alarm ON/OFF Status: Alarm ON-Lighting Off / OFF-Red Light
(g)	LAMP ON/OFF	Internal LED Lamp ON/OFF Button
(h)	MUTE	Alarm Mute Button
(i)	COOL	Indication for Peltier Cooling
(j)	SET(TEMP.)	Temperature Set-up Button
(k)	^	Button for Increasing Value in Temperature Setting Mode
	v	Button for Decreasing Value in Temperature Setting Mode
(l)	SHAKER RUN	Indication Lamp when Shaker is Running
(m)	RPM/TIME	Setting and Display Mode Switching Button for RPM and TIME
(n)	SET(SHAKER)	RPM Setting and Timer Setting Button
(o)	^	Button for Increasing Value in RPM or TIME Setting Mode
	v	Button for Decreasing Value in RPM or TIME Setting Mode
(p)	START/STOP	START or STOP Button

4. INSTALLATION

Unpacking

Packing for this item is done with hard cartons and pallet. Use proper tools like carts or trolley.

When received the carton of this product, carefully examine for any shipping damage before unpacking.

Open the carton carefully and check all the parts of incubators are fine. If damage is found, promptly report it to the carrier and request a damage inspection properly.

Unpack the incubator from its wrapping and take the sponge which fixing shaker out.

After unpacking, verify all packaged items are properly in incubator.

1. Operation Manual
2. Power Cable
3. Stacking Kit (Hidden in top of incubator: Check this out only when stacking is necessary)

If any items are missing, contact provider and report the missing.

4.1. Installation

Single use (no stacking)

Place the incubator on the floor or table near an electrical outlet and make enough space(at least 5cm) around incubator for free air convection, accessory attachment and user convenience.

Stacking use

Place the incubator on flat floor and ensure enough space around incubator to lift incubator by two people. Make sure that base incubator is level and placed at bottom securely. Open top cover of base incubator and find the stacking kits. Referring some procedures and photos in page. 8, fix the cover to support upper incubator securely and install stacking kit as described in page 8. Use the grip at both sides and lift one incubator to be mounted on incubator at floor. When locking the grip into stacking kit, watch injury on hand. Press down one side of upper incubator to lock the grip into stacking kit more easily.

Electrical Requirement

Check the serial label near power receptacle and confirm the voltage, hertz, and the model number.

Ensure that the power cord cable is not damaged and use the cord fit to outlet in lab.

Shaker Installation

Shaker is basically placed on the bottom of chamber. Just ensure that it is placed at its place properly. 4 of shaker rubber feet are mounted on 4 hexagon bolts which are fixed on bottom of chamber. If any shaker is out of its base bolts, correct it to be placed securely. Move the platform by hand to be sure that shaker rotate smoothly and shaker is mounted on its place well. Visually check that shaker connector is properly connected into its outlet at right back and bottom of chamber. Refer to photos of shaker connector show in the section 3.4 in page. 9. Ensure the platform is horizontally level.

Platform Installation

At each corner of base platform, there are four thumb screws supporters to mount universal platform or spring rack platform. One spring rack platform is basically mounted on the base platform. If other dedicated platform or tube rack platform is needed to use, just take spring rack out and fit the desired platform in four supporters, thumb screws.



Do not operate shaker with an unbalanced load. Platforms should be loaded for optimum stability and operation. Do not lift up platform when lifting up shaker to take out from chamber.

Note: Sample Loading Capacity on Shaker

RPM capacity with some flask platform is as following:

Flask Platform	Total Weight(sample volume)	Reachable Max RPM
250 * 9	4.65(250ml full)	300
	4.20(200ml)	300
500 * 5	4.6(500ml full)	300
	3.05(200ml)	300
1000 * 2 * 3 * 4	3.85(1000ml full)	300
	5.15(1000ml full)	295
	6.5(1000ml full)	260
1000 * 2 * 3 * 4	3.10(600ml)	300
	4.60(600ml)	285
	4.95(600ml)	250
2000 * 1	3.4(2000ml full)	300
2000 * 1	2.6(1400ml)	300



Do not operate the shaker at speeds that will cause the contents of vessels to be thrown out.

Reversible Door Installation

Door is installed to open basically from right to left. If it is needed to reverse the door open position, unscrew 2 screws of door hinge that are fixed in main body. Leave other two screws in hinge which fixing door. Remove four plastic screws which are filled in the screw taps at right side(at front view) of incubator, fix the door hinge with securing screws in its screw taps.

Drain hose Installation (NB-205QMC only)

For NB-205QMC, find the drain hose at back of incubator. Place it in proper place avoiding area of electric part. Place the tray at end of tube to collect water from chamber. Regularly check the collecting tray not to overflow.

5. OPERATION

- 1) Place the power switch(located on the right side of the unit) in the "ON" position.

Display will show current temperature and RPM.

- 2) To set the desired temperature, press the "SET" key located underneath the temperature display.

The set temperature is displayed and will blink continuously. It can be adjusted by using the UP(▲) and DOWN(▼) buttons. Once the desired temperature is displayed, press "SET" key to save the value. To confirm the programmed value, press "SET" key and confirm the value flashing in display.



Controllable temperature range is as followings:

NB-205QM : Ambient +5°C ~ 60°C

NB-205QMC : 15°C ~ 60°C

- 3) To set the desired time to stop shaker, press and hold the "RPM/TIME" key for approximately 2 seconds until LED displays "t 00.00". Press the "SET" key located underneath the RPM/TIME display. The set time is displayed and will blink continuously. It can be adjusted by using the UP(▲) and DOWN(▼) buttons. Once the desired time is displayed, press "SET" key again to save.

*** If you do not press "SET" key to save the desired time, the new set time will not be saved and the set time will return to the prior setting.**

**** If you do not need timer and do need the control for shaking just by On/Off switch, leave the time set at "t 00.00"**

- 4) To set the desired mixing speed when shaker stop, Press "RPM/TIME" key to switch RPM display mode like r 30 ~ 300. Press the "SET" key located underneath the RPM/TIME display. The set speed is displayed and will blink continuously. It can be adjusted by using the UP(▲) and DOWN(▼) buttons. Once the desired speed is displayed, press the "SET" key to save.

- 5) To change the desired mixing speed, just press and hold UP (▲) or DOWN (▼) keys until display value reach to desired RPM. Don't change RPM largely during shaking. Within 100 RPM, adjust RPM as you want.

*** If you do not press "SET" key to save the desired speed, the new speed will not be saved and the set speed will return to the prior setting.**

**** Speed should never be set below 30 rpm and above 300 rpm. Setting range is 30 ~ 300 rpm.**

*****Do not set the shaker in upper stack at more than 200rpm, when using it with stacking option.**

Internal Lamp in Chamber

Press the LAMP key in the control panel to turn ON the internal chamber light.

Temperature Calibration

To enter temperature calibration mode, press V key in temperature setting part about 3 seconds. Display will be flashing with last calibrated value. In this mode, adjust display value using ▲ or ▼ keys and press SET button to save the adjusted value.

6. ALARM AND ERROR MESSAGE

Press and hold MUTE key for more than 3 seconds until short alarm come out and indicator lamp of alarm is turned off. No lighting in alarm indicator means that the alarm system is ON.

6.1. Alarm Event (Factory Programmed)

1. Door : If Door is opened more than 30 second, alarm will be activated.

- If door is closed when alarming, alarm will automatically stop.
- If mute button pressed when alarming, alarm will be delayed for 3 minutes.
- If door is opened continuously after 3 minutes of delay by mute function, alarm will be re-activated.

2. Temperature : $\pm 1^{\circ}\text{C}$ (Tolerance Range), 8 minutes(Tolerance Time)

- If temperature is staying more than $\pm 1^{\circ}\text{C}$ from the setting temperature for more than 8 minutes, temperature alarm will be activated. (Beep-Beep/ Beep-Beep/~~)
- If temperature is recovered and stayed in tolerance range for more than 1 minute, alarm will stop.
- If mute key is pressed during the temperature alarm, 10 minutes of alarm delay will be given.

3. Shaker : $\pm 5\text{RPM}$ (Tolerance Range), 60 seconds(Tolerance Time)

- If RPM value of shaker deviate more than the tolerance range for more than tolerance duration, alarm will sound. Based on factory program, if the shaker runs more than $\pm 5\text{RPM}$ from the setting RPM for more than 60 seconds, audible alarm will be activated with fast flashing on shaker RUN indicator lamp.
- If RPM recovered into tolerance range, then the alarm will automatically stop.
- If mute key is pressed during the shaker alarm, 10 minutes of alarm delay will be given.
- If there is door open during RPM alarm, shaker will stop and alarm system will be inactivated. Then, alarm system for shaker will be initialized. Once you start the shaker again, alarm system for shaker will be re-armed by arming delay process as described as below section.

6.2. RPM Alarm Programming

This mode is to adjust alarm condition such as tolerance time and deviation range.

To enter RPM alarm programming mode, press RPM SET key and turn Power S/W ON simultaneously. RPM display will be flashing with numbers(100, factory programmed). This is the first mode of alarm programming.

First Mode is RPM Alarm Arming Delay Time which is the length of time that is allowed for the shaker to recover after starting the shaker or opening the door, and before the Alarm System is armed again. This helps to prevent unnecessary alarms from occurring. Factory programmed value is 100 seconds. For most cases, 100 seconds are enough time for shaker to achieve set RPM. If it is necessary to adjust, change the value by using up and down key. At desired value of time, press SET button to save the value and turn to Second Mode.

Second Mode is Tolerance Deviation Range. It is adjustable between 5 and 10. Allow at least 5 RPM deviation to avoid frequent alarming. Adjust the range like previous first mode setting and press SET button at desired value to save and to go to Third Mode.

Third Mode is Tolerance Time Delay for higher or lower RPM than tolerance deviation. 60 is recommendable.

6.3. Temperature Alarm Programming

To enter this mode, press TEMP SET key in the state of power off and turn power S/W ON. Temperature LED will be flashing with a number like "Ar 1.0"(Factory Programmed deviation is $\pm 1^{\circ}\text{C}$) which means the Tolerance Temperature Range for temperature alarm. If temperature in display deviates more than this programmed value for more than 8 minutes, alarm will be activated.

In this mode, adjust this value within adjustable range(1 ~ 3) by using up and down key. To save the new value, press SET key. Then temperature display will be turned to normal condition with showing current temperature in chamber.

When the incubator and alarm system are switched ON, or after any value has been reprogrammed, the Temperature Alarm System is inactive until the set point temperature is achieved within $\pm 1^{\circ}\text{C}$ and maintained for more than 1 minute in that tolerance range. Alarm is armed through this delay program.

- Over Temperature Cut-Off (visual warning only)

Thermal cut-off have sensor attached on exterior surface of chamber separately from main temperature sensor. This protects over-heating when some fail happened in temperature control or sensor.

Turn the dial of this safety device to be set $+5^{\circ}\text{C}$ from the set temperature point to avoid unnecessary cut-off.

6.4. Shaker Error Messages



1) This message "rErrL" represents a low speed error.

- Check the platform to ensure that nothing is obstructing its movement.
- Check the set speed to make sure that it is within the acceptable range(30 to 300rpm).

Solution: Use your hand to move platform. While the platform is moving, press and hold the "STOP" and "SET" keys simultaneously.



2) This message "rErrH" represents a high speed error.

- Removal of load or partial load.

Solution: If a vessel has been removed, replace the vessel or restart the machine.



3) This message "Error" represents an electrical error.

- Machine has lost the power during the run.

Solution: Check that the power cord is properly installed and restart.

Check that the circuit has not been interrupted and restart.

7. MAINTENANCE



Disconnect the plug from electrical outlet before attempting any maintenance or repair of the unit.



Do not attempt to service or repair this product under warranty before consulting your N-BIOTEK dealer. After warranty period, such consultation is still recommendable, especially when the repair may be technically sophisticated or difficult.

7.1. Cleaning

Regular cleaning is recommendable. Maintaining the unit clean will lead to extend its life time.

Clean the exterior of the unit with a soft cloth using a solution of mild soap or 70% alcohol.



Do not use some chemical solution for cleaning. It may give damage on exterior painting or steel material.

To clean inside the chamber completely, take out the shaker from the chamber. First, disconnect its plug at back and right of chamber. Then, lift the shaker up vertically grabbing shaker body and take it out carefully from the chamber. Clean the chamber with soft cloths and 70% alcohol. After that, dry the chamber completely before operation.



In the event of a spillage: Turn off the unit, remove the shaker and dry the internal chamber with a soft cloth. DO NOT attempt to operate the unit until the spillage has been properly dried.



Do not grab the shaker platform when lifting up the shaker to avoid any damage to platform.

For NB-205QMC, there is drain hose for the water coming from Peltier element. Water is formed in Peltier element and flow it through the drain hose when using it for lower temperature than ambient. To avoid any contamination from remained water in the drain hose which is located from back of chamber and exterior back of incubator, make it clean and dry regularly. Also, place the drain hose in proper place avoiding it is flown to electricity. Place the water tray or proper vessel to collect the water from this drain.