OPERATING MANUAL

DRYING OVEN

NB-901M

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N-BIOTEK
Leading Life science

1. General Information on Precaution

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

Other marks:

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1.1 Precaution for using the power cable

Caution

Compliance — 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.)

Compliance — The power outlet must be only for this product.
(Using various products simultaneously can cause a fire.)

Compliance — Clean the power plug with a dry towel and connect it properly.
(Foreign substances or unsafe connection can cause a fire.)

Prohibition — Do not over bend the power cable and do not make it to be pressed by heavy products. (When it is damaged, it can cause a fire.)

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

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

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

1.2 Precaution for transportation, storage, and location of installation

Caution

Please check the voltage & Hertz written on serial label.
(Over-voltage, under-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.)

When you install the product, you have to put the distance of at least 20cm from the wall. (Minimum space for internal air circulation.)

Install the unit at a flat surface, free from vibration and in a well-ventilated location.
(If the ground is not flat, it can cause an excessive vibration of the product.)

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

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.)

You must not disassemble, fix and remodel the product by yourself.
(You can damage the product throughout a fire and malfunction or get a property loss as well as experimental loss.)

1.3 Precaution for use

Caution

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

Do not use an 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 cloth.
(It can cause an electric leakage and a fire.)

Permissible ambient temperature range for transport: 2℃ to 40℃.
Permissible ambient humidity: max. 80%

This product is generally used at high temperatures, and due to the generation of pressure by heat inside, leave the air vent configured in the device open and use it.
(It can cause burns.)

This product is generally used at high temperatures. Be sure to wear safety gloves that can withstand high temperatures when putting or taking out objects.
(It can cause burns.)

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

Do not subject the product to shock. The sight glass might get damage.
(Damage may result in bodily injury.)

To prevent overheating, please set the SAFETY S/W +10℃ over than setting temp.
(Safety device for overheating.)

1.4 Precaution for ground connection

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

At the place where you can't ground,
* Please buy the equipment to prevent any electrical leakage.
* An electric shock, an electric leakage and a fire can be occurred without an electric leakage breaker.

Do not ground to these places; Gas Pipe, water pipe, pipe, lighting rod, telephone wire etc.
* Wrong ground connection can cause electrical leakage which eventually results in fire.

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

2. Features and Specification

2.1 Features

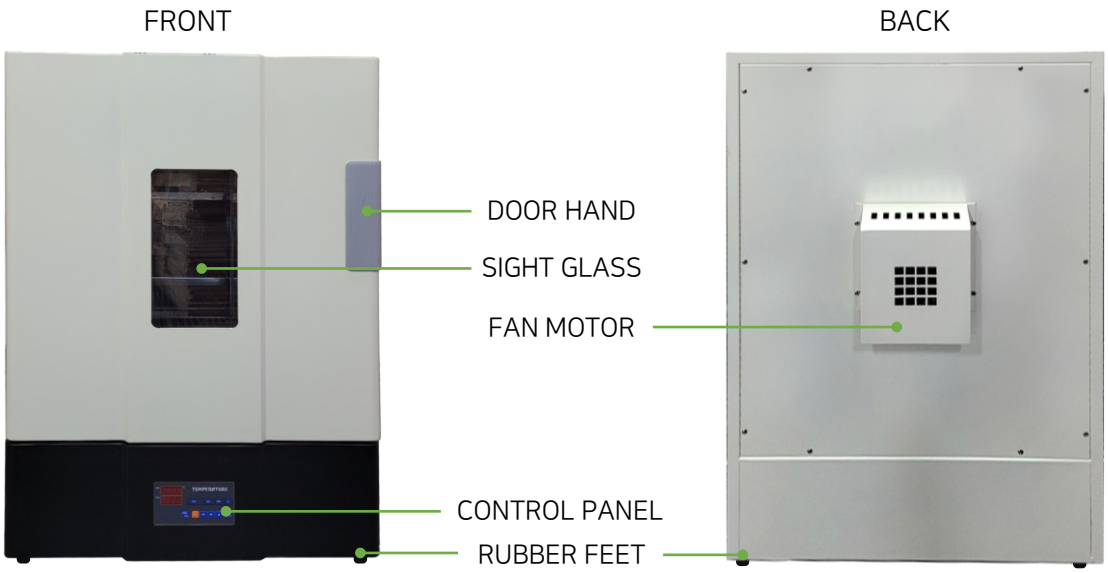
- The material of the chamber (inner) is made of stainless steel, and the material of the body (outer) is steel plate (CR41) coated with powder to prevent corrosion.
- The door is equipped with SILICONE PACKING to minimize the injection of external air into the interior. Tempered glass (sight glass) is installed in the middle of the door so that the inside can be easily observed.
- Excellent temperature control by applying the self-designed Digital P.I.D Controller.
- Designed to put the test object in multiple stages by installing a shelf (SUS WIRE) inside the chamber.
- Minimize the risk of internal fire with PIN HEATER.
- By installing the AIR VENT HOLE on the top of the equipment, safety is ensured so that it can leak to the outside if pressure is generated inside during high-temperature testing.

2.2 Specification

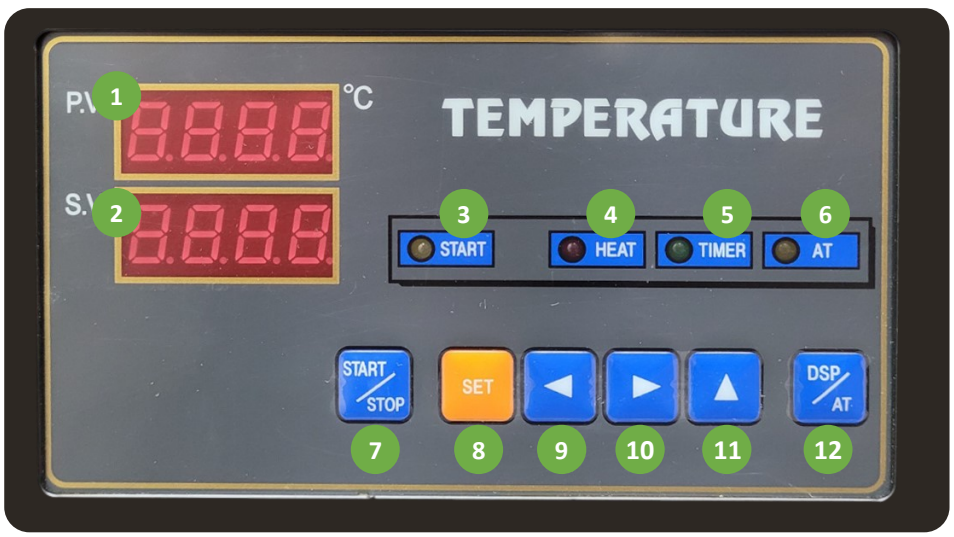
MODEL	NB-901M
Temp. Range	Ambient +5℃ to 200℃
Temp. Accuracy	±2℃
Temp. Controller	Digital P.I.D Controller
Temp. Indicator	Digital Display (LED)
Dimension (In)	500x500x600Hmm, 150 Liter
Dimension (Out)	660x780x1100Hmm
Material (In)	Stainless Steel (STS430)
Material (Out)	SCP-1 (Powder Coating)
Circulation Fan	180W Blower Fan
Shelves	3ea

3. Configuration and Control Panel

3.1 Configuration



3.2 Control Panel



NO	NAME	FUNCTION
1	Temp. Display	Showing actual temp. of the equipment
2	Setting Display (Temp, time)	Showing setting temp. and time
3	Start / Stop Lamp	Indicate Start / Stop
4	Heater Lamp	Indicate heater
5	Timer Lamp	Indicate timer
6	Auto-Tuning Lamp	Indicate auto-tuning run
7	Start / Stop Button	On/Off equipment
8	Parameter Setting Button	Parameter setting
9	Shift L Button	Movement of the place for temp., timer, parameter setting (Left)
10	Shift R Button	Movement of the place for temp., timer, parameter setting (Right)
11	Setpoint Increase Button	Setting value change
12	DSP (AUTO-TUNE) Button	On/Off Auto-tune

4. Operation Manual

4.1 Warm-up

- Turn on the MAIN POWER S/W.
- The temperature signed screen display present inside temperature of chamber when you push START/STOP Button.
- If you want to check Time Setting, press 12 DSP/AT Button lightly. Then set time will display on the screen.
- If normal set time is 00.00, the screen display --.--.

4.2 Start

- The temp. control start straight after power on. If you fixed Timer value already, the timer stand by working until reach to fixed temp.
- Timer start working when the temp. arrive at fixed temperature.

4.3 Temperature and Time value change

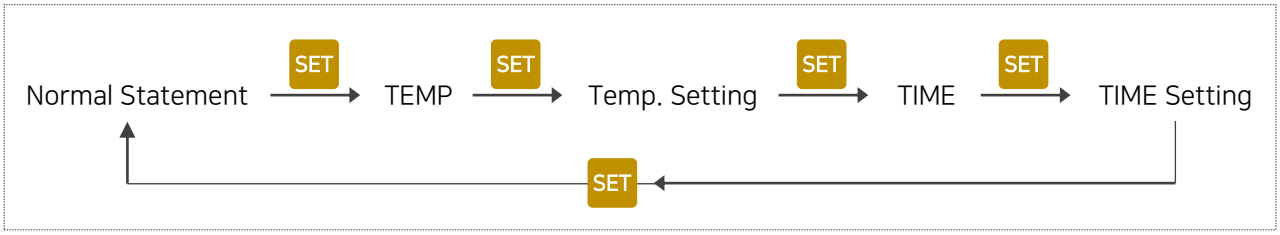
4.3.1 Temperature value change

- To change setting value, you should release after push SET button.
- “TEMP” sign will appear on the Temp. display.
- Press SET button one more time, the first digit will blink, waiting for input.
- Set your wanted temp. with SHIFT(◀, ▶) & INC(▲) button.
  - The SHIFT button is to use curser moving.
  - The INC button is to change setting of applicable point. This is to revolve from “9” to “0” when you push the button.

4.3.2 Timer value change

- To change setting value, you press SET button one more time after temp. setting.
- “TIME” sign will appear on display.
- Press SET button one more time, the first digit will blink, waiting for input.
- Set your wanted time. with SHIFT(◀, ▶) & INC(▲) button (Same as above).
- The change value can be used 99 hour 59 min, or 99 day, 23 hour.
- If the setting is finished, push release after pressing the SET button. It will come back as normal statement sign.

- Each press of the SET button cycles through as follows:



* If you don't want to use Timer, please set MODE -> N2=0.

<Setting range of Time>

00.00 - 99.23 (Day, Time) -> In case of 2 of time scale parameter of Model

00.00 - 99.59 (Time. Min) -> In case of 1 of time scale parameter of Model

00.00 - 99.59 (Min .Sec) -> In case of 0 of time scale parameter of Model

The setting time is this sign of "00.00" , The time is not work, controlled only Temperature.

4.4 The sign of working statement

Start

- When "START" button is pressed, timer is not working until get to the setting temperature as flickering the display of timer.
- The unit will be started when current temp. gets to setting temp., display of time will stop flickering, and timer starts.

End

- After the timer is over, the display is flickered with “END” in order with action lamp appears.
- Change temp. setting during timer operation or change temp. or time setting in TIMER_END state, the timer starts again from the beginning.
- If only the time setting is changed during Timer operation, the WAIT_ZONE function does not work and restarts with the changed time.
- WAIT_ZONE function refers to a function that delays timer operation until the current temp. reaches the set timer start temperature.
- From END state, heater control output turns off.
- During normal statement, the temp. controls by digital PID.

Timer operation

- Timer is automatically operated with START button as settings at following value.
- In case actual temp. lower than setting temp.
  Actual Temp. > Setting Temp. – ACTP
- In case actual temp. lower than setting temp.
  Actual Temp. < Setting Temp. + ACTP

* ACTP value: Timer start temp. setting value for WAIT_ZONE function.

4.5 AUTO-TUNING

- For controlling temperature, press "AT" button over 5sec. Then "AUTO-TUNING" lamp is flickered with the tone(beep), and TUNING automatically start. After TUNING, stop flicking with the tone.
- During the TUNING, make to stop with "AT" button over 5 sec Display a setting temperature as following for AUTO-TUNING.

4.6 Parameter setting

- Please do as following for the parameter setting.

1) Press SET button over 5 sec. from normal statement.
2) rnt input mode display with beep sound.
3) The first digit will blink and wait an input order.
4) Please set wished value with SHIFT(◀, ▶) & INC(▲) buttons.
   - If you want to set another parameter, press SET button several times.
   - You can see each parameters when you press the button.
   - After last parameter, it goes back to first parameter input mode.
5) If you press SET button over 5 sec. in parameter setting mode, it goes back to normal statement with beep sound.
6) If you don't input order over 1min. in parameter mode, it goes back to normal statement.

4.7 Parameter List

1) rnt : input temperature maximum range value
   - "PT Type Board" setting range : -99.9 – 299.9 degree (Celsius)
   - "CA Type Board" setting range : -99.9 – 999.9 degree, while using decimal point.
     or -99 – 1370 degree, while not using decimal point.

2) ACTP (The value of start temperature timer) :
   It's parameter for Start temperature value setting timer.
   - Absolute value(Present-fixing temperature) > ActP : Timer start working
   - Present temperature > fixing temperature - ACTP value : Timer start working
   - Present temperature < fixing temperature + ACTP value : Timer start working

   * Setting range: 00.0 - 99.9 degree(celsius)

4.8 Setting Range : 00.0 – 99.9 degree (Celsius)

1) Prd (Period) : It is Output period
   - Setting range : 1 – 99 sec.

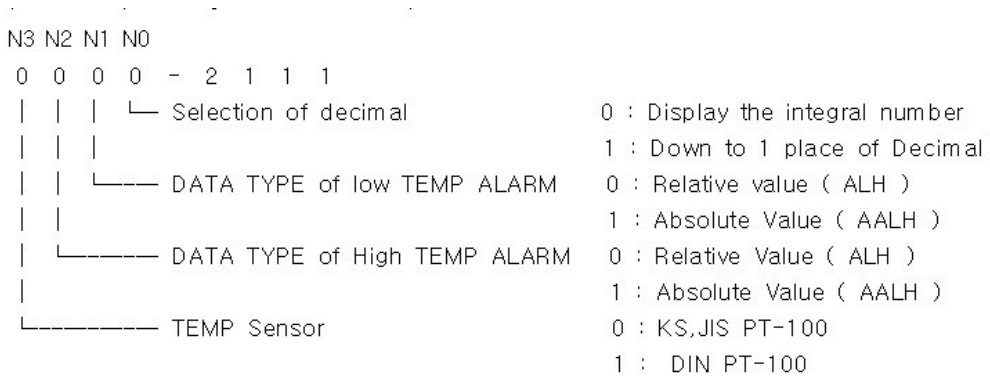
2) P (PROPORTION) : It is fixing value of proportion ratio
   - Setting range : 0 – 9999

3) A (ANTI-INTEGRAL) : Anti-Integral setting value
   - Setting range : 0 – 6999

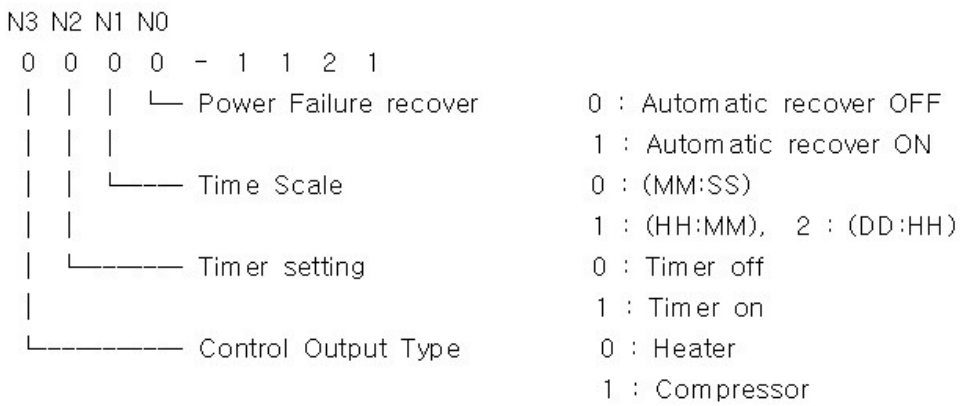
4) I (INTEGRAL) : It is fixing value of integral calculus
   - Setting range : 0 – 6999

5) D (DIFFERENTIAL) : It is fixing value of differential calculus
   - Setting range : 0 – 6999

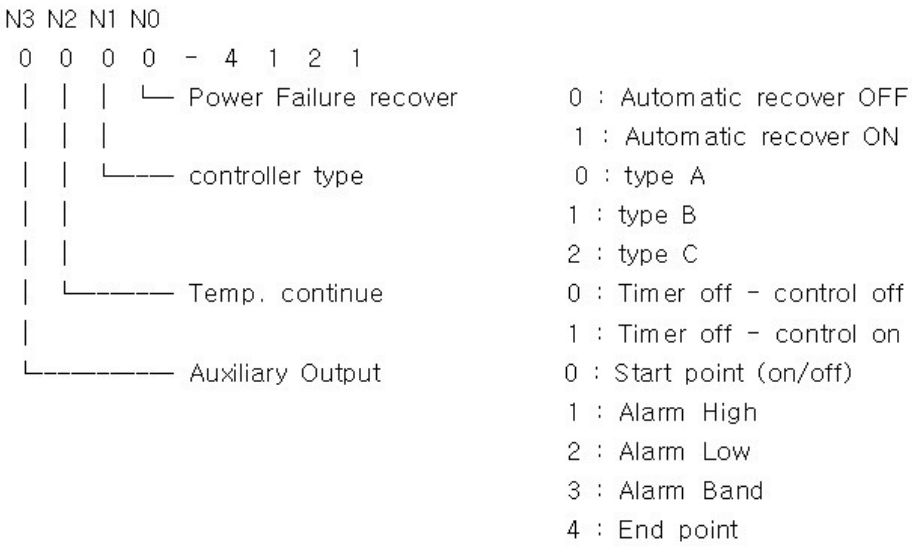
6) Mode 0 (Running mode control)



7) Mode 1 (Running mode control)



8) Mode 2 (Running mode control)



(Type A): timer end->buzzer on

(Type B): timer end->heater off->after (AOFF) value, Alarm off->display 'END' & beep

(Type C): timer end->heater off->alarm off->after (AOFF) value, display 'END' & beep

9) Cton (Maximum cooler on hours when defrost)

- Setting range : 0 – 9999 min.

* Examples for use

It is time of cooler working for defrost. It indicate with minute and if you set up Cton=600 & Ctof=15, cooler working 600min and start again after rest on 15min. If you want to display fixing present temperature at screen during defrost hours, please set as below 12) dTon. This time just start after cooler off. Please see using examples on the back of manual for more details.

10) CtoF (Defrost time with Defrost ability (COOLER OFF))

- Setting range : 0 – 9999 min.

It is cooler off time but you set up '0', the defrost ability is gone. (Because of Time off)

11) CdLy (Cooler delay time : Delay time of power outage or beginning power on)

- Setting range : 0 – 9999 min.

It just can use when cooler working delay time with (mode N3=1)

12) dTon (Fixing temperature time for defrost ability on the screen)

- Setting range : 0 – 9999 min.

Fixing time for do not change temperature on the screen when defrost.

The timer start working defrost upon cooler off.

13) drAn (Fixing temperature range)

- Setting range : 0.0 – 99.9 degree (Celsius)

This ability fix the temperature within regular range when temperature has change.

* Examples for use

The temperature work get out of from 0.1'c when control the temperature with cooler only. If you want to set up the temperature to +/- 0.6'c range, Please fix to 0.6'c. In other word, if you set up 4.0'c, the screen just display 4.0'c for 3.4'c ~4.6'c. It's possible for no use decimal point.

3.4'c - 4.6'c --> 4.0'c

14) Aoff ('END' display point - type 'B' & 'C' selected)

- Setting range : pt : -99.9 _ 299.9 degree

ca : -99.9 _ 999.9 degree

ca : -99.9 _ 1359 degree

Please contact N-BIOTEK Technical Service or your local retailer for any inquires and service issues.

WARRANTY

Thank you for purchasing our product.

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.

ITEM	DRYING OVEN	MODEL	NB-901M
DATE OF INSTALLATION		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 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.

Signed by.

N-BIOTEK
Leading Life science

President Daeyong Kim
N-BIOTEK,INC.