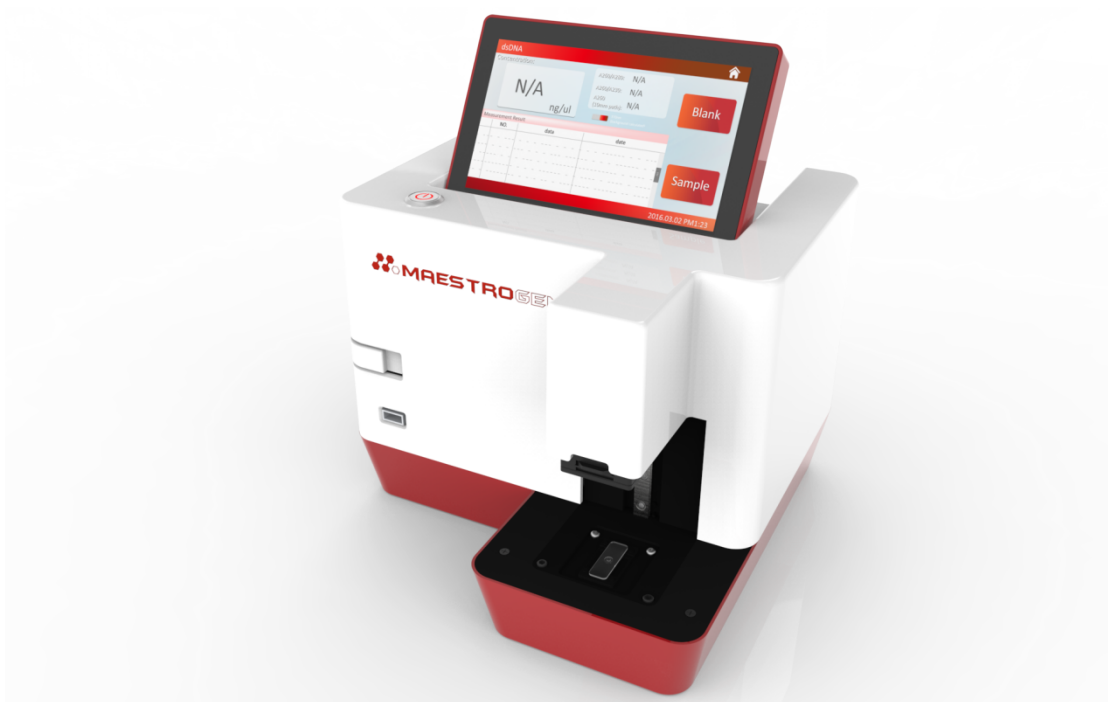




# MaestroNano<sup>®</sup> Pro Spectrophotometer

## Instruction Manual



Catalog Number: MN-913A

Version 728-16

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## Care and Safety

We recommend users should read the details shown in “Care and Safety” carefully, and confirm the follow announcements before using MaestroNano Pro.

- Maintain the integrity of the components.

MaestroNano Pro is a “non-optical-fiber” system. It utilizes two quartz glasses to make the solution drawn into a column between the surfaces and to achieve the measurement. When users set up MaestroNano Pro at the first time, be careful to put the upper / bottom quartz glass into the upper / base-portion metal plate, and always keep glass in the specific position. (See details at the chapter of “Installation & Operation Flow”, page 10 & 11) If user wants to move MaestroNano Pro, please handle it with care and avoid any hit or strike on the quartz glass since it may result in broken fragments.

- Keep away from the danger of the ultraviolet light.

MaestroNano Pro is equipped with a xenon flash lamp as the light source. The ultraviolet (UV) light from xenon flash lamp would damage eyes and skins. In order to avoid the exposure of your eyes and skins to the UV light, users should keep the metal cover closed, and do NOT open it when you do measuring. Please never look at the light source (, which is combined with ultraviolet light) directly.

- Conditions of environment.

In order to maintain the accuracy of measurement, it is suggested to prevent the upper/base-portion metal plate from the damage of any external force, and avoid the impact, collision, vibration, or even slight shaking when the system under measurement. It is also suggested that MaestroNano Pro should be operated at a rigid and stable bench in the room temperature (about 25°C) without strong wind blowing, wetted and dusted bench surface, and without fire or hazards. When user does not use MaestroNano Pro, please turns off the power and keep it un-plugged to make sure it always in safety.

When packing MaestroNano Pro is needed, please cover the instrument with the original bubble bag we provided and place the device into the lower buffer packaging materials for the firm fixation during the delivery. Place the top buffer materials onto MaestroNano Pro as the way you saw when you opened it for the first time. The kind suggestion for our local service centers: please check with your customers about the status of MaestroNano Pro corresponding to “Troubleshooting” or another instruction form Maestrogen before the device is going to be delivered. We always

hope to notify our customers with general notices and avoid unintentional damage. Last but not the least, please read the chapter “Maintenance”, page 31, before cleaning the instrument.

## About MaestroNano Pro

MaestroNano Pro is a specialized instrument that developed by Maestrogen for bio-chemical research only. The main function of MaestroNano Pro is the concentration measurement from two micro-liter nucleic acid or protein solution. Nucleic acid means double-stranded nucleic acid (dsDNA), single-stranded nucleic acid (ssDNA), and ribonucleic acid (RNA).After dispensing sample on the surface of the central area of the quartz glass, users can select sample type and begin to measure.

MaestroNano Pro is a “non-optical-fiber” system, which can contribute to the longer product life-time compared to others embedded with optical fiber as consumables. MaestroNano Pro offers a user-friendly interface and also discards the external physical buttons so that users can get a better experience when doing the measurement.

- Non-optical-design :

With Maestrogen’s new technology, non-optical-design, MaestroNano Pro can offer the high reliability in accuracy and can prevent from the unavoidable issue caused by the attenuation of light intensity in the optical path when those devices equipped with fiber-optic components as consumables.

- High precision in the positioning of optical path:

The height of optical path-length is precisely fixed in 0.5mm by fixed pin. Compared to other micro-volume spectrophotometers, which need to be constantly calibrated to maintain the precision and make the optical path length into position, MaestroNano Pro works with a metal cover that can “straightly” go up and down in y-axis via a reliable slider and that way contributes to the rigid positioning of the optical path length in y-axis and always to be perpendicular to the bottom quartz glass. The deviation hardly occurs in the position of the optical path length in our system unless the device is subjected to the strong physical impact.

- Adjustable light intensity contributes to the stable performance:

In order to prevent from the impacts caused by the derivations in various environmental conditions, such as different ranges of temperature, humidity, latitude...etc, and to make sure the measurement for the same sample should be leaded to the same results. The adjustable light source provides with the adjustable voltage in intensity. With this new technology, you just need two micro-liter of ddH<sub>2</sub>O as the standard, and get back to the stable performance again via the built-in

calibration mode.

The measurement results can be accessible via the embedded touch panel, thermal printer, USB storage as well as WiFi transfer. To satisfy most researchers' requirements for concentration measurement, MaestroNano Pro defines a most reliable measurement range of concentration of 2~2000 ng/ $\mu$ L, and successfully resists the interferences of ambient light for a more accurate measurement. Also, MaestroNano Pro does not intend to change light path length during measurement to reduce frequency of calibration. Instead, MaestroNano Pro develops and offers an in-house mathematical algorithm to help users acquire a more reliable, repeatable, and reproducible bio-chemical data.

## Important Note

This instrument is intended for the laboratory research use with nucleic acid/protein solution. Before each instrument delivered to customers, Maestrogen performs an in-house algorithm calibration by a fixed optical path length of instrument between upper and bottom quartz glass which are respectively inserted in the upper-portion and the base-portion metal plates.

**IMPORTANT:** This Maestrogen instrument is designed and certified to meet safety standards and EMC regulations. Certified products are safe to use when operated in accordance with the instruction manual. This instrument should not be modified or altered in any way. Alteration of this instrument will:

1. Void the manufacturer's warranty
2. Void the safety and EMC certification
3. Create a potential safety hazard

Maestrogen is not responsible for any injury or damage caused by the use of this instrument for purposes other than those for which it is intended, or by modifications of the instrument not performed by Maestrogen or an authorized agent.

## Warranty

The MaestroNano Pro is warranted against defects in materials and workmanship for one year. If any defects occur in the instrument or accessories during this warranty period, Maestrogen will repair or replace the defective parts at its discretion without charge. The following defects, however, are specifically excluded:

1. Defects caused by improper operation.
2. Repair or modification done by anyone other than Maestrogen or an authorized agent.
3. Quartz glass is the consumable product, it not include the warranty.
4. Damage caused by substituting alternative parts.
5. Damage caused by accident or misuse.
6. Damage caused by disaster.
7. Corrosion caused by improper solvent or sample.
8. Use of fittings or spare parts supplied by anyone other than Maestrogen.

For any inquiry or request for repair service, contact your local Maestrogen office. Inform Maestrogen of the model and serial number of your instrument.

## Technical Support

Maestrogen offers technical support for all of its products. If you have any questions about the product's use or, operation, please contact Maestrogen at the following info.

8275 South Eastern, Avenue #200, LAS VEGAS NV89123, USA

E-Mail: [info@maestrogen.com](mailto:info@maestrogen.com)

# Parts and Features

## Specifications

Items	Spec.
Measurement Sample Size	2 $\mu$ L
Measurement Data Output	1. OD <sub>230nm</sub> , OD <sub>260nm</sub> , OD <sub>280nm</sub> , OD <sub>320nm</sub> 2. Sample Concentration (ng/ $\mu$ L) 3. OD <sub>260nm</sub> /OD <sub>230nm</sub> , OD <sub>260nm</sub> /OD <sub>280nm</sub>
Light Propagation Material	Quartz glass and pinhole
Absorbance Range (10mm)	0.04~40
Concentration Range	2 ng/ $\mu$ L(dsDNA) ~ 2000 ng/ $\mu$ L(dsDNA)
Path length	~ 0.5mm
Measurement Time	Less than 5 sec at Conc. >25 ng/ $\mu$ L
Operation Voltage	12V DC / 2.5A
Adaptor input Rating	100-240Wac, 50-60Hz, 1A
Operation Power Consumption	Stand by :2 W General :10 W When drive thermal printer:15~20W
Data Connection Interface	OTG USB (connected to PC to access) WiFi(USB Dongle) Ethernet ( RJ-45) USB Port *2
Data Output Interface	Touch panel, Thermal printer, USB storage, Web server storage
USB Port Operating Voltage(max)	5Vdc, 0.5A
Touch panel Resolution	7 inches, 1024(W) $\times$ 600(H) dots matrix
Operation System	Android version 4.4.3
Internal Storage	32GB
Maintenance	Auto Diagnosis Calibration Mode Fixed path length
Operation environment Temperature	0~40°C
Operation Humidity, Altitude	0-80% RH, under 2000m
Light Source	Xenon flash lamp
Size	26(W) $\times$ 26(D) $\times$ 22(H) cm
Weight	4.2 Kg (Not including adapter)



## Hardware Instruction

MaestroNano Pro shows glamorous appearance as well as user-friendly Interface that is easy to use. All the functions can be accessible through touch panel.

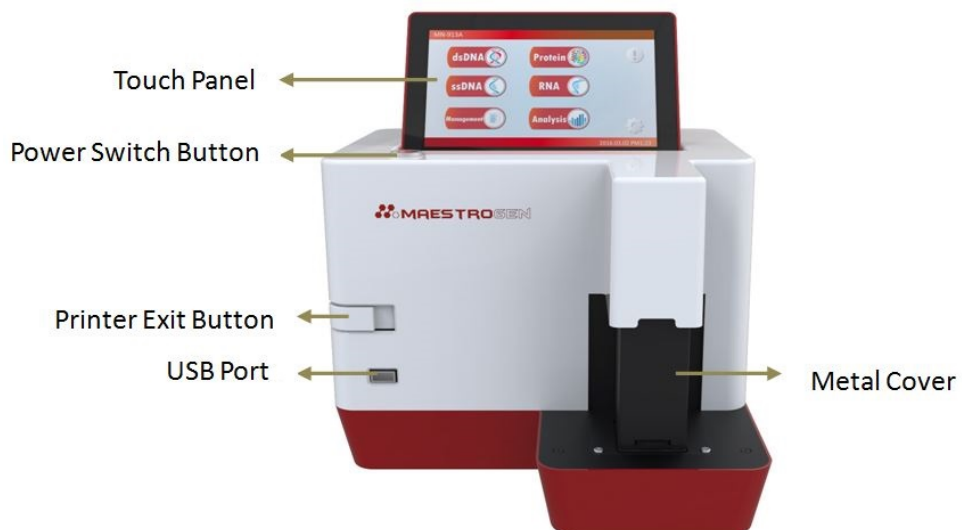


Fig 2-1. Overall picture

Metal cover and Upper-portion metal plate work through the slide way down to form the liquid column between the couple of quartz glasses.

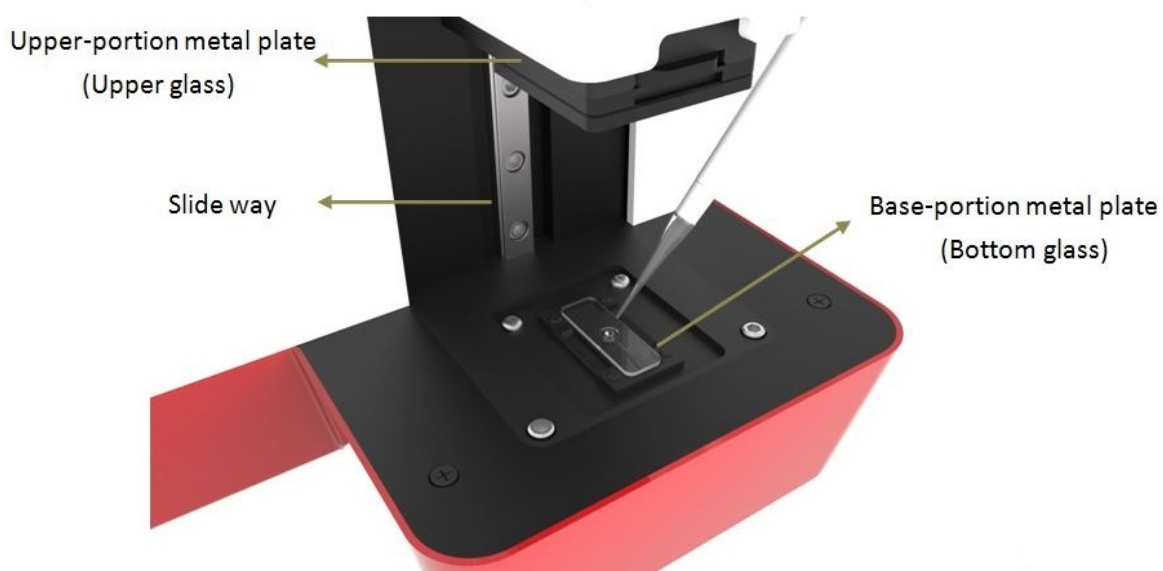


Fig 2-2 Measurement Region

MaestroNano Pro provides with the functions of wireless data transfer and the network capabilities via USB WiFi dongle.

Ethernet port: The Instrument can be connected to Ethernet hub with an Ethernet cable.

USB port: Insert a USB device such as a memory stick into a USB port on the computer. One more USB port is located on the front panel.

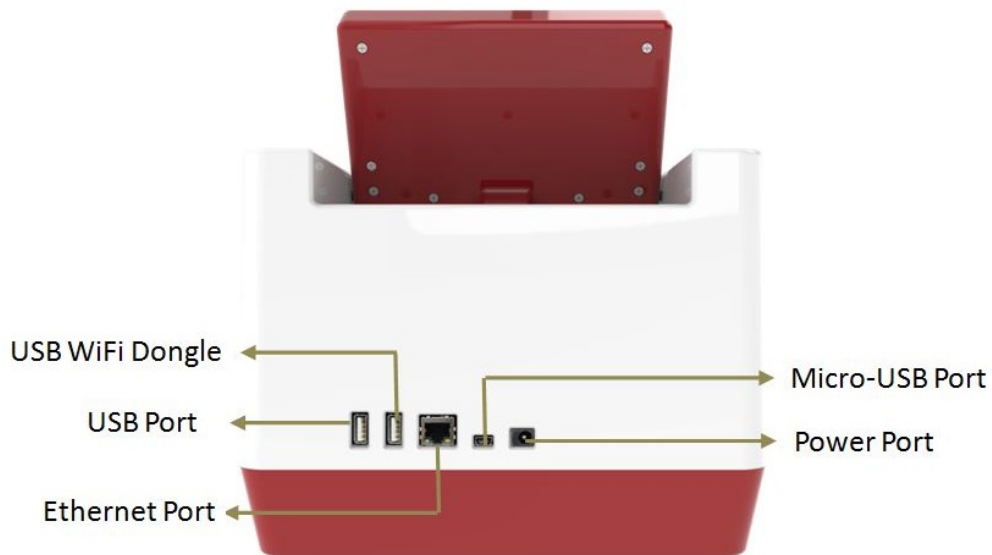


Fig 2-3 Back view

Thermal printer: With the 57 mm width thermal paper. The exit button is for the replacement of the paper roll.



Fig 2-4 Printer paper output (Paper auto cutting function)

# Installation & Operation Flow

## Installation

Carefully unpack the MaestroNano Pro as the following steps:

1. Firstly, remove the buffer materials at the top of device.
2. Take the instrument out of the two bubble materials shells and place it on a stable, horizontal stage without other vibrating devices nearby, such as centrifuges and ice makers.
3. Remove the protection packaging materials.

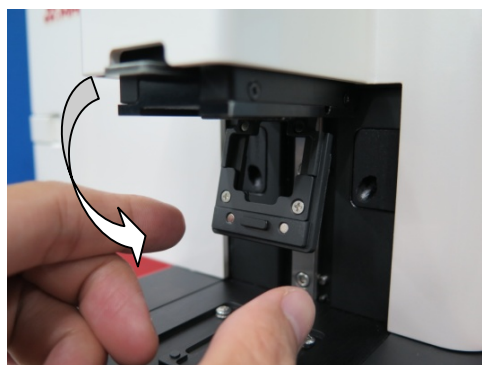
Standalone installation:

1. The instrument must be placed on a bench and keep at least 10 cm-distance from itself to other items to avoid the any possibility of crash that may reduce the measurement accuracy.
2. Pick up the couple of glasses. Put Upper glass (flat) into the upper-portion metal plate carrier and fasten the carrier; put Bottom glass (with a circular region in the center) into the base-portion metal plate. After the completion, **do NOT** remove the couple of glasses. See the procedure as follows:

Step 1: Open the upper-portion metal plate carrier.



Step 2: Unfold the carrier.



Step 3: Put Upper glass (flat) into Upper-portion metal plate carrier, and check the glass should get stuck into the "U" type slot.



Step 4: Close the upper-portion metal plate carrier.



Step 5: Take the button quartz glass and confirm the fluted surface facing up.



Step 6: Put bottom quartz glass on the base-portion metal plate.



3. Connect the instrument to the power by using the annexed cable from Maestrogen. The adaptor supplies 12 V DC voltages. When the system abnormal, please unplug the power wire.
4. The angle of the touch panel screen can be adjustable to any angle (<90 degree) , depending on the user's need.
5. Make sure the instrument is **NOT** connected with smart phone while user wants to start up.

## General Precautions

- Prevent the upper-portion and the base-portion metal plate from damage of any external force.
- Do not pull the thermal printer exit button when operation.
- Do not measure any solution when the upper-portion metal plate is open.
- Do not take out the couple of quartz glasses when operation.
- Do not splash liquids directly on the instrument.
- Switch off the instrument immediately after use.
- The power switch button of the MaestroNano is no segment type. The user can press first time to start the instrument, and press it for a few seconds again to select power- off.

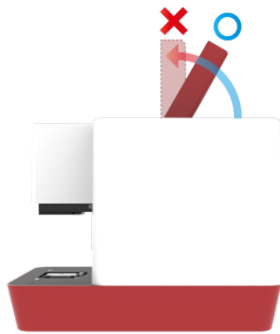
## General Operation

Make sure the instrument is NOT connected to smart phone with USB port before starting up. Plug power line before using MaestroNano Pro to measure nucleic acids or proteins solution.

### **Measurement Flow**

#### Step 1:

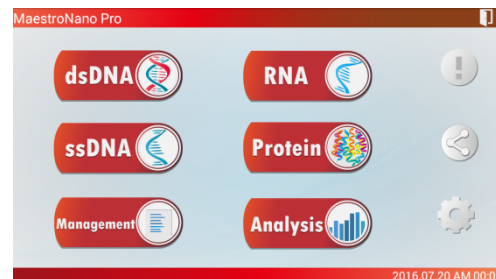
Adjust the angle of the Touch panel screen up to user's best view, but do not over 90 degree.



We proposed to adjust 60 degree for the best view, do not over 90 degree.

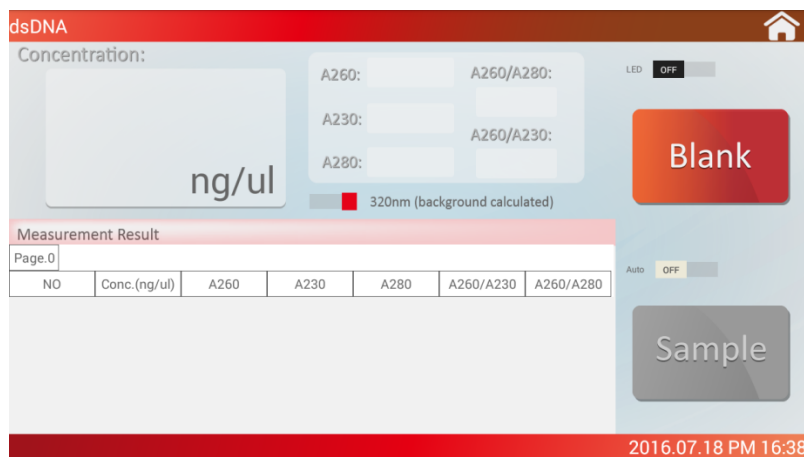
#### Step 2:

Press the power switch button to start MaestroNano Pro. The power switch button will be lighting with red signal. The screen shows Main Menu as shown below when the instrument is ready.



#### Step 3:

Select the type of measurement sample in the main menu; enter in the control page of dsDNA(or ssDNA, RNA, Protein).



Step 4:

Lift the metal cover to the top. Pipette two micro-liter of water (Do not use sample buffer or other solutions!) onto the center of bottom quartz glass.



Be sure to pipette the droplets inside the circle

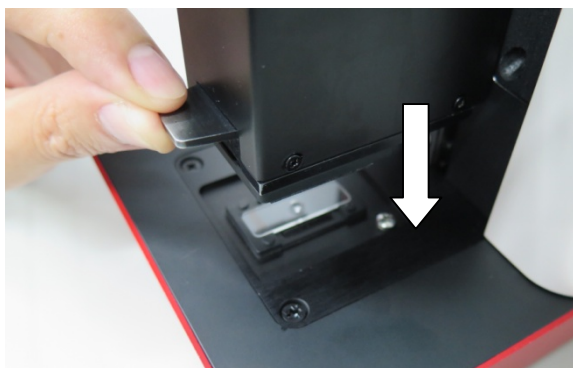


Do not drip solution outside the circle.



### Step 5:

Close the metal cover, and touch the button “Blank”. The default setting of this system is auto-calibration after enter the measurement page at the first boot. The display shows “Device Calibrating!”&“Blank Measuring!”. After that, users can replace the blank solutions or measure blank again, depending on users’ needs.



We strongly recommend users close the metal cover via the handle grip down gently; it is the elegant attitude to keep the device “in good shape”



The “sample” button is disabled without the blank measurement at the first boot.

Note: Auto-measurement only measures the sample data. It is disabled until users do the blank measurement first.

### Step 6:

After blank solution measurement, lift the cover to the top. Clean the surface of upper and Bottom quartz glass with a soft and lint-free cloth. **Do NOT** forget to clean up upper quartz glass when the cover is opened; make sure always to wipe the samples out and keep the quartz glass clean.

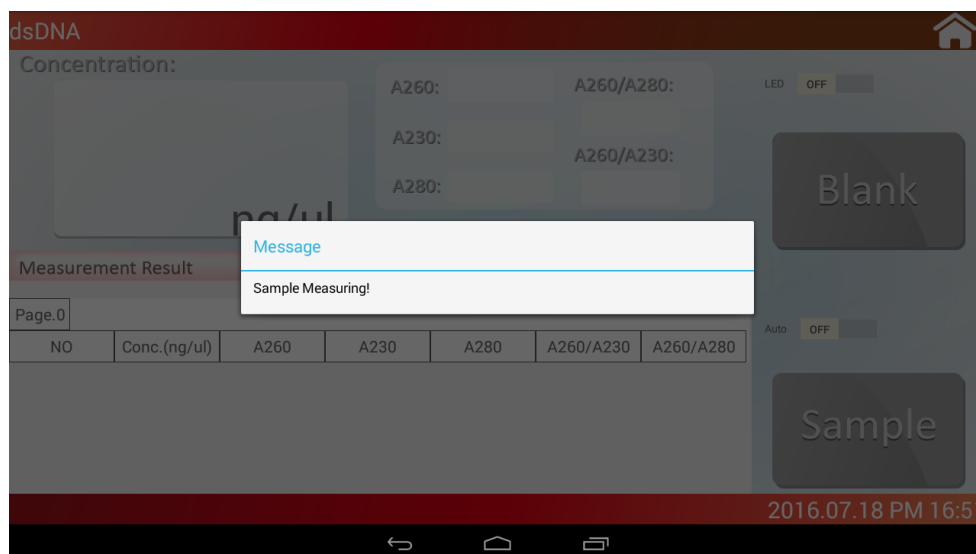
Do not forget to clean up upper-quartz glass after measurement!





### Step 7:

Pipette 2 micro-liter sample solutions onto the center of Bottom quartz glass. Touch the button "Sample" and wait for the measuring result available.



User can check the measurement results in the section.



### Step 8:

After you finish the measurement, please drop water to clean quartz glasses with the soft and lint-free cloth.

### Note:

If the function of Auto-measurement is on, the sample-measurement starts automatically right after user closes up the cover. (The option of Auto-measurement will be available only after the blank-measurement is done.)

## **Data Output**

### Method 1 – Touch panel

After measuring, the screen will display the latest results. Touch the button “Home” and then it will save the data to files automatically. All the data is stored in “Management” page.

### Method 2 – Thermal Printer

Please refer to the section of software instruction.

### Method 3 – USB flash drive connection

User can access to the measurement results from MaestroNano Pro connected to USB port. After the successful access to the data, user can remove the connection just like removing USB flash memory stick on PC. Step 1 is removing from software, and the step 2 is removing from hardware.

### Method 4 –Web server storage

User can use share button connect to Maestrogen’s web server without downloading anything to your smart phone or computer. Open your device's QR code scanner and scan the QR code on the touch panel to connect to files control center, or enter the URL that appears on the touch panel.

## Software & Function

Turn on the power button to start MaestroNano Pro. It will show Main Menu after the boot screen is finished. The booting process takes around 30 seconds.



Fig.3-1 boot screen

### 1. Main Menu

The Main Menu shows four kinds of measuring targets, (1) dsDNA, (2) ssDNA, (3) RNA and (4) Protein; five functional pages such as (1) Management, (2) Analysis, (3) About, (4) Setting and (5) Share button. Touch each button, it will turn from white to be blue and then enter the page.

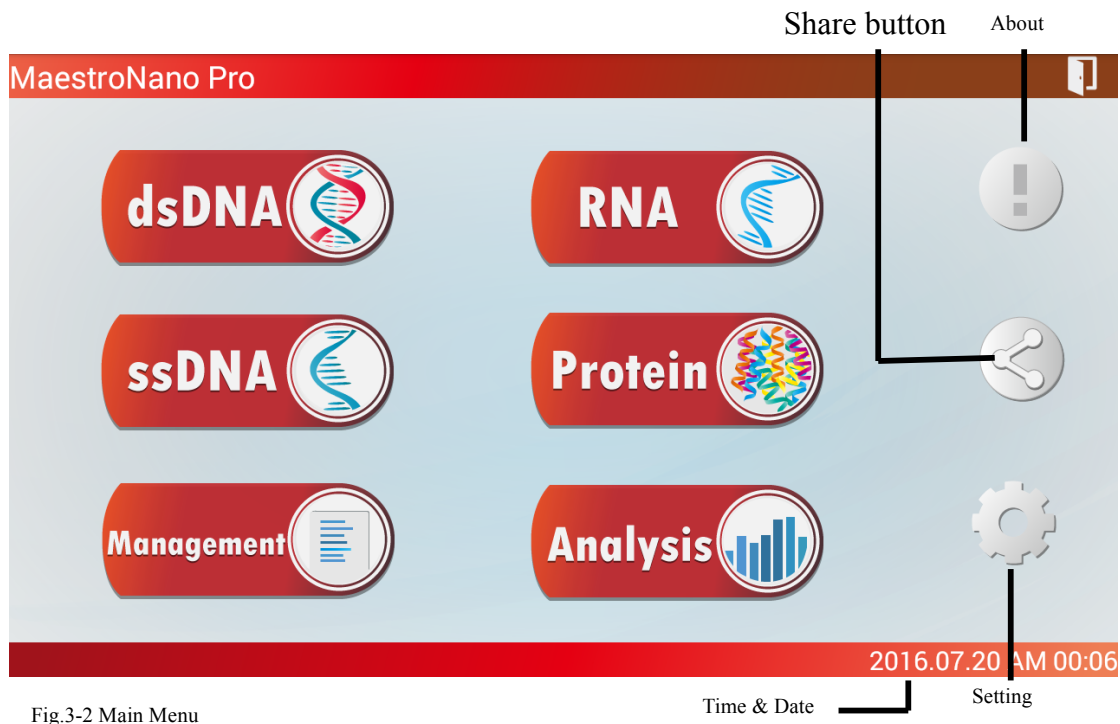


Fig.3-2 Main Menu

## 2. dsDNA/ssDNA/RNA

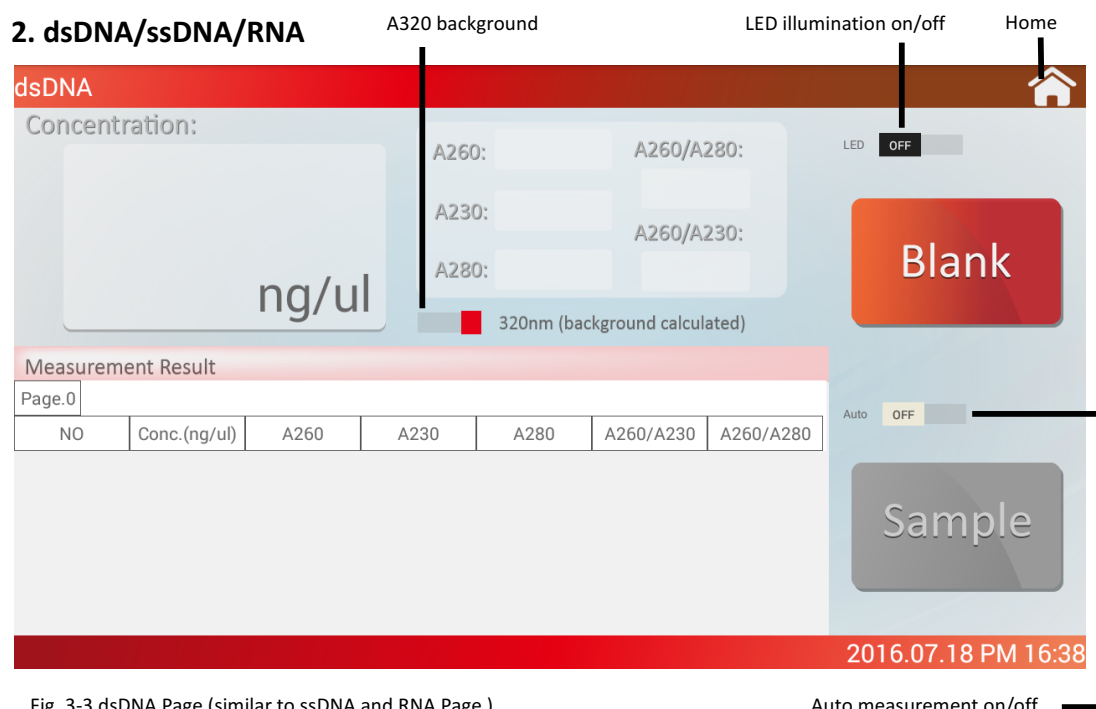


Fig. 3-3 dsDNA Page (similar to ssDNA and RNA Page )

Auto measurement on/off

### LED on/off:

MaestroNano Pro provides with orange LED as the auxiliary light when users do pipetting before measurements. Turn on the LED to see droplets of samples in details. The System will turn off the LED automatically during measurement.

### Auto measurement on/off:

MaestroNano Pro is designed with an auto-measurement function which works when users do the measurement of "Sample" in the basis of the same blank. It is convenient to do a quick measurement for the same series of samples but different conditions and that way makes a more linear equation of the measurement results. In general, this function is disabled without doing blank, and will work after blanking.

\*If Auto-measurement is switched on, the sample measurement starts automatically after users close the metal cover. Each time users close the metal cover, the system triggers the xenon flash lamp to emit the ultraviolet light. It would do damage on eyes and skins. In order to avoid the danger of the exposure from the unshielded light source, please **do NOT** open the metal cover during measurement.

\*If user skips to another page by touching the button "Home", Auto-measurement function will be turned off.

### Calculation with A320 as background:

The background correction is a process that discards the absorption at 320nm spectrum when do the sample analysis. Absorption at 320 nm may be various due to

the light scatter caused by particles, the precipitation in the solution, or other unexpected pollutions.

If A320 background correction turns on, the equation of the ratio A260/A280 and

A260/A230 will be converted into  $\frac{A260}{A280} \rightarrow \frac{(A260-A320)}{(A280-A320)}$  &  $\frac{A260}{A230} \rightarrow \frac{(A260-A320)}{(A230-A320)}$

## Home

Go back to the main menu. As long as “Home” button is touched, all the measurement data will be saved in “Measurement” page automatically.

Note: If user skips to another page by touching the button “Home”, Auto-measurement function will be switched off.

## Start Measurement:

In order to make sure users do the blank first, the “sample” button should be disabled without doing the blank measurement; MaestroNano Pro has the built-in calibration procedure which refers to ddH<sub>2</sub>O as the calibration standard. Pipette two micro-liter of ddH<sub>2</sub>O (**Do NOT** use sample buffer or other solutions!) onto the center of Bottom quartz glass, close the metal cover, and touch the button “Blank”.

MaestroNano Pro will run the auto-calibration process whenever users enter the measuring target pages (dsDNA/ssDNA/RNA/Protein) after the first boot. The calibration procedure takes about thirty seconds, and the screen will show the message: “Device Calibrating!” & ” Blank Measuring!” during the procedure.



Fig. 3-4 Touch “Blank” button will come out the auto-calibration message at the boot.

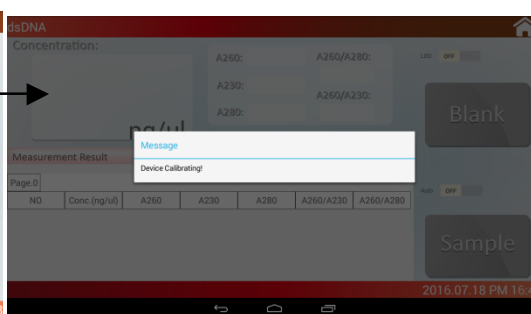


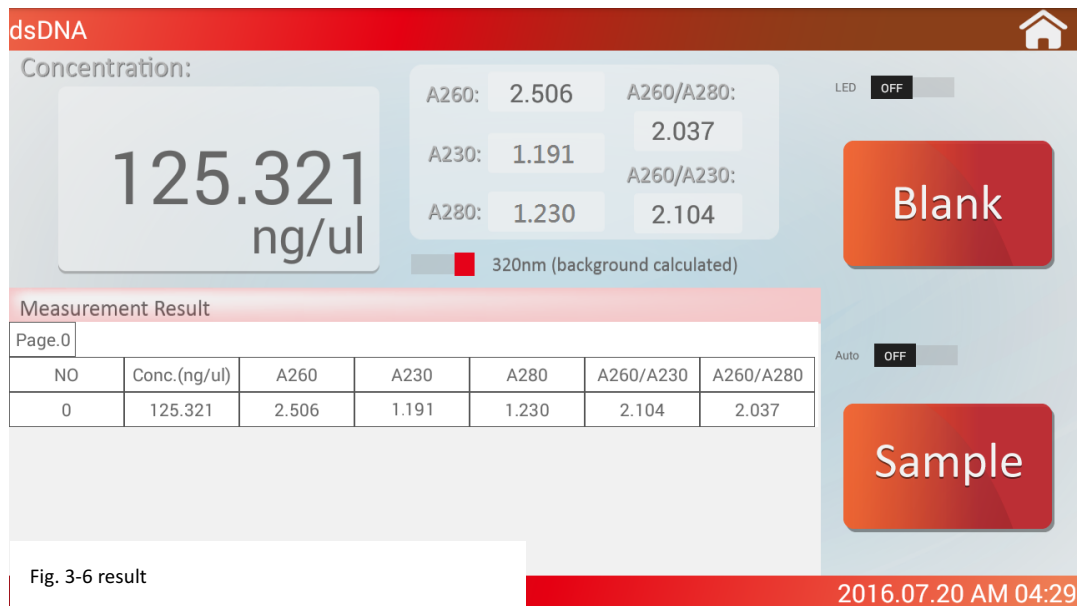
Fig. 3-5 Sample and Auto-measurement is enabled after blanking.

Users can change the blanking solutions and measure blank again if needed. After the blank measurement, the button “sample” will be enabled and ready to use. Please make sure both Upper and Bottom quartz glass is clean. Pipette two micro-liter of sample solutions onto the center of Bottom quartz glass, close the cover, and touch the button “sample”.

Note:

Users can start measuring with auto-measurement function, the sample

measurement starts automatically after users close the metal cover. Measurement results show the 260nm absorbance in the absorption of 1cm cuvette path length, the purity / ratio (A260/A280) and (A260/A230), and the concentration.



### How to save data

All the measurement data will be saved in "Measurement" page automatically as long as "Home" is touched.

### 3. Protein

The outline of Protein page is similar to dsDNA Page; Measurement results show the 280nm absorbance in the absorption of 1cm cuvette path length and the corresponding concentration by selecting the sample type shown in the pull-down menu.

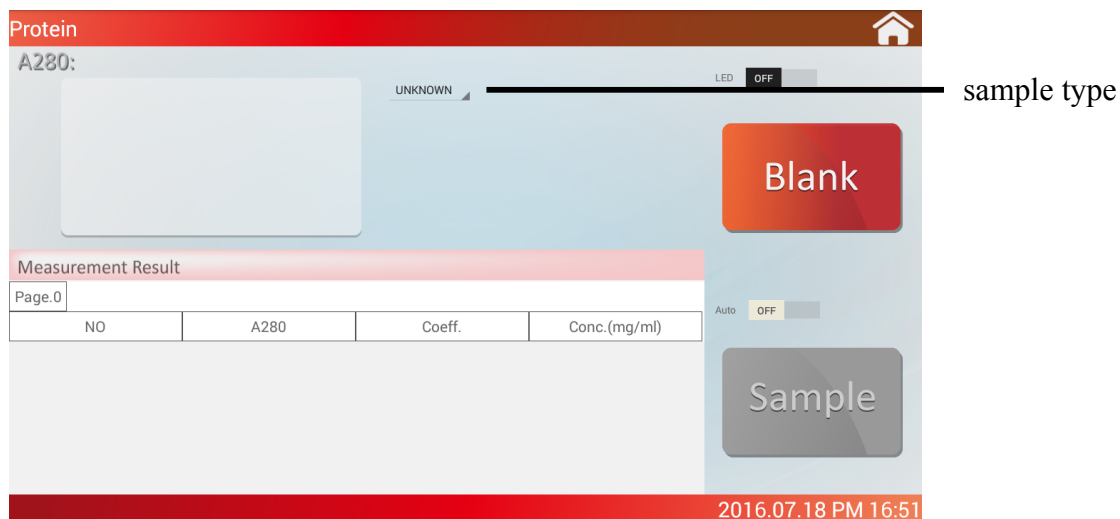


Fig. 3-7 Protein interface

Scroll down the button “sample type” to select different sample types.

### Sample Type:

There are five types of built-in protein quantification assays, such as BSA, IgG, Lysozyme, User define and Unknown.

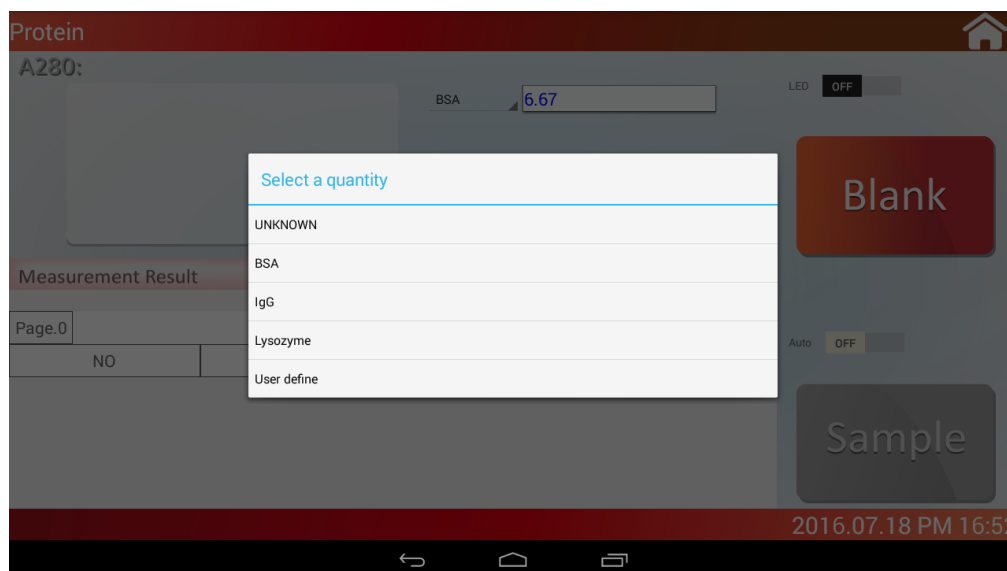


Fig. 3-8 Select sample type

BSA (Bovine Serum Albumin, 6.67 L/gm-cm)

IgG (any mammalian antibody, 13.7 L/gm-cm)

Lysozyme (egg white lysozyme, 26.4 L/gm-cm)

“User define” is allowed to enter the extinction coefficient by users, themselves. Tap the blank region and it will pop up with the keyboard to key in the number of the specific extinction coefficient.

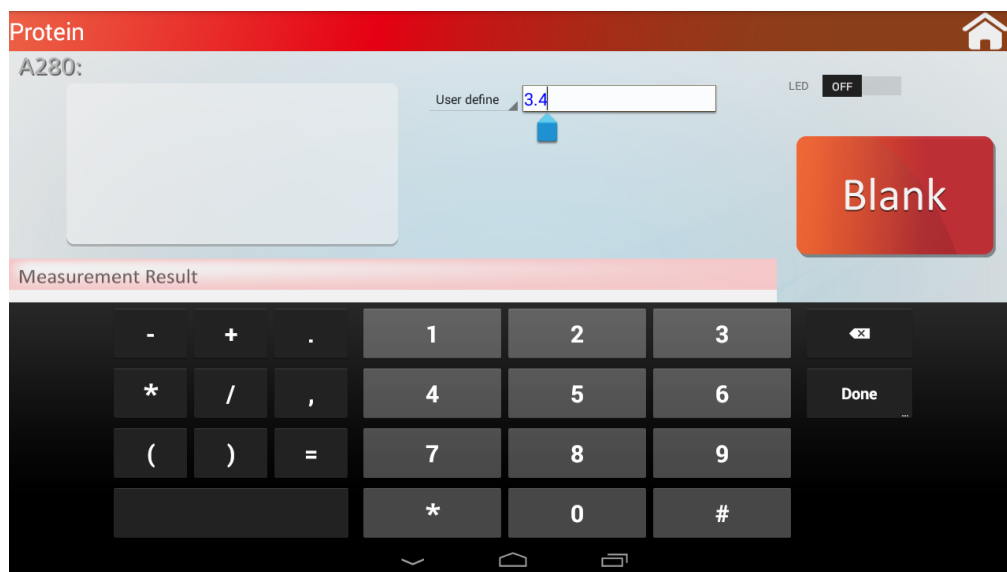


Fig. 3-9 User define

‘unknown’ which means users don’t know which type of sample is measuring will

show the extinction coefficient as 1 as default, and will not to calculate the concentration, only show A280 in the measurement result.

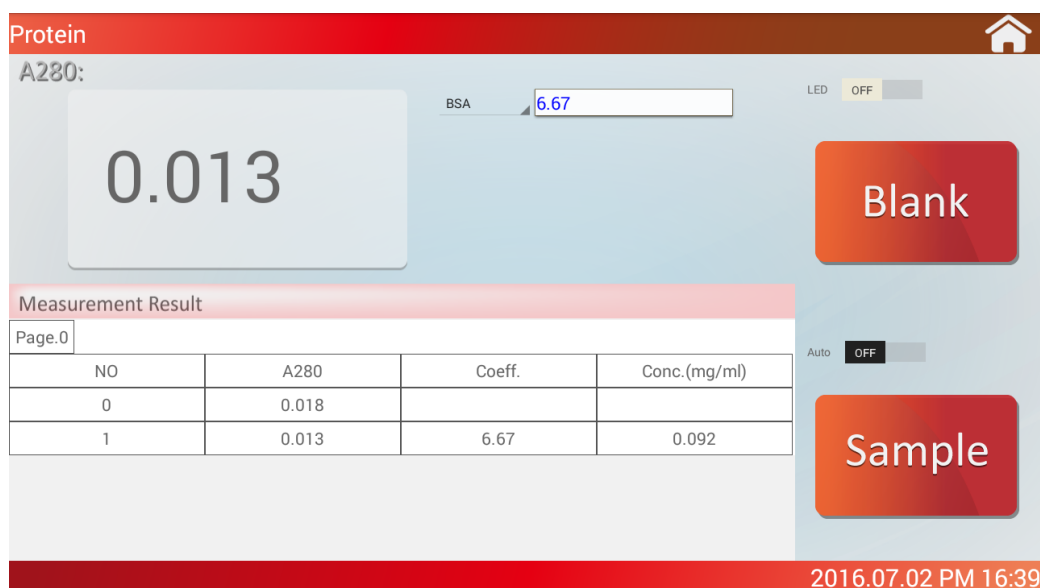


Fig. 3-10 The result of protein page.

#### 4. Management

All data files are saved and named by time in Management page. Select the left column to turn up the list page in the right column as well as the functional buttons in the top of the left page. User can rename the file or delete it; furthermore, saving data to USB storage is also available.

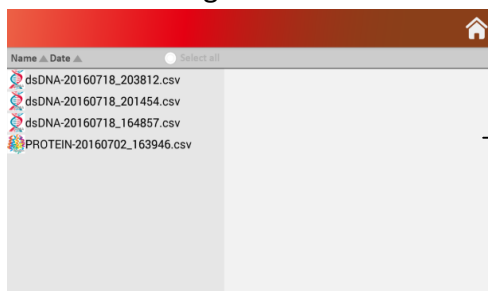


Fig. 3-11 Management page

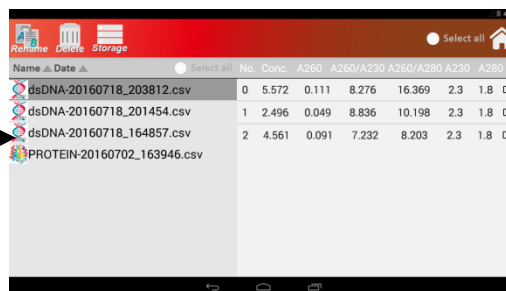


Fig. 3-12 All function in management page

The list page shows all the saved data sheet in the right column; the maximal capacity for saving is fifty sheets. User can select items from the list to turn up functional buttons “Print” and “Delete” in the top of the right page.

#### Print:

MaestroNano Pro is embedded with a thermal printer, and the width of thermal paper is 5.7 cm. Users can print out single or multiple sheets of data on the thermal paper by touching the button “Print”.



## 5. Analysis

The operation interface of Analysis is similar to Management page. Its function is to help make a quick calculation of the samples that is going to be mixed and diluted to obtain a normalized concentration quickly. Touch the items in left column will turn up a list page in the right column.

Name	Date	No.	Conc.	A260	A260/A230	A260/A280	A230	A280
dsDNA-20160718_203812.csv		0	5.572	0.111	8.276	16.369	2.3	1.8
dsDNA-20160718_201454.csv		1	2.496	0.049	8.836	10.198	2.3	1.8
dsDNA-20160718_164857.csv		2	4.561	0.091	7.232	8.203	2.3	1.8

Users can select the items from the lists to turn up the functional button “Normalization” in the top of the right page. Touch the “Normalization” to add those items into Calculation page.

Name	Date	No.	Conc.	A260	A260/A230	A260/A280	A230	A280
dsDNA-20160718_203812.csv		0	5.572	0.111	8.276	16.369	2.3	1.8
dsDNA-20160718_201454.csv		1	2.496	0.049	8.836	10.198	2.3	1.8
dsDNA-20160718_164857.csv		2	4.561	0.091	7.232	8.203	2.3	1.8

The “Normalization calculations” help acquire the solutions with the target concentration as well as the volume of stock solutions needed to achieve a specified volume and concentration. Key the required “total volume” in, and then the desired concentration in “target concentration”.

	No.	Conc.	sample volume	buffer volume
total volume	0	5.572		
target concentration	1	2.496		
	2	4.561		

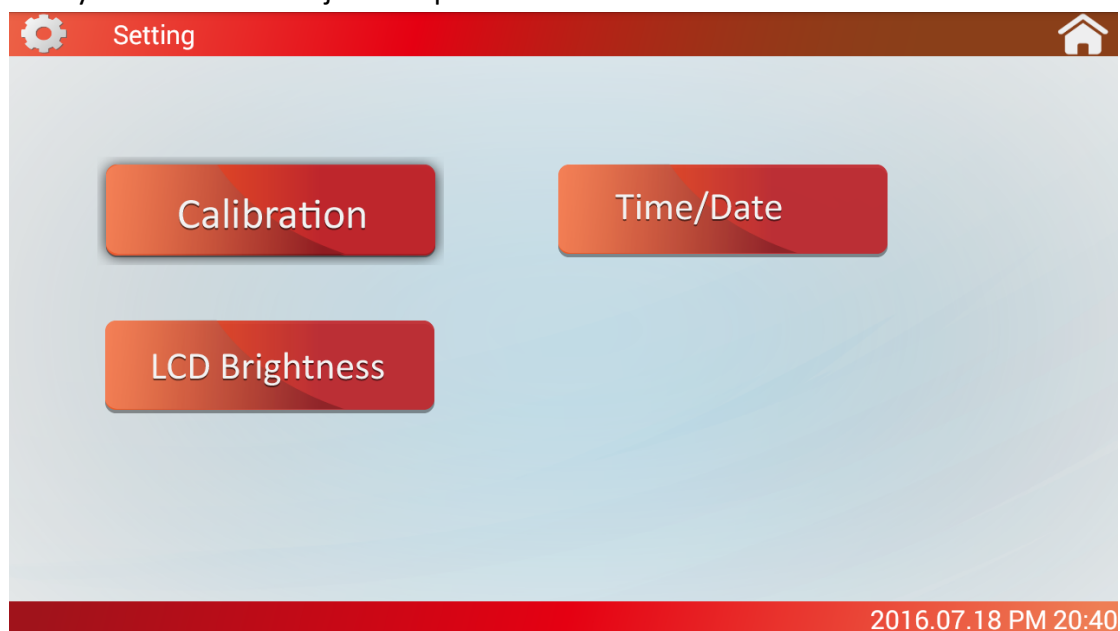
The column “Sample Volume” (or “buffer Volume”) represents the concentrated conditions in red after the press of “Calculate” button.

	No.	Conc.	sample volume	buffer volume
total volume	0	5.572	3.589	6.41
target concentration	1	2.496	8.012	1.987
	2	4.561	4.385	5.614

## 6. Setting

Click on the gear-shaped button and enter in the setting page.

Here you can find the adjustable parameters as below:

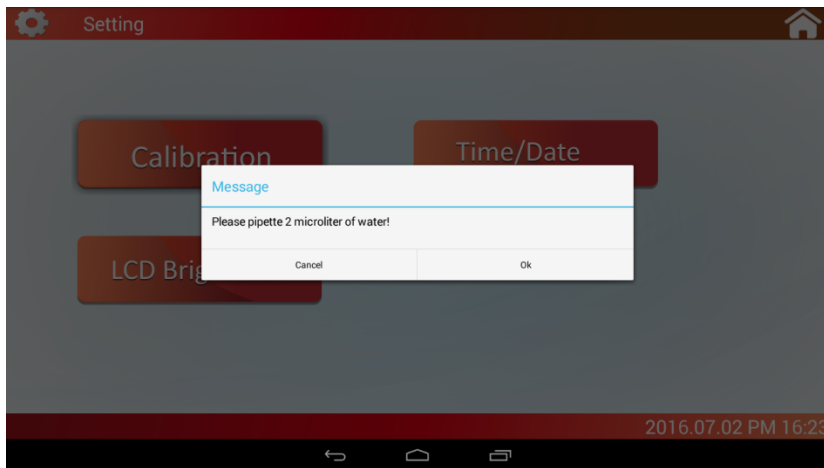


### Calibration:

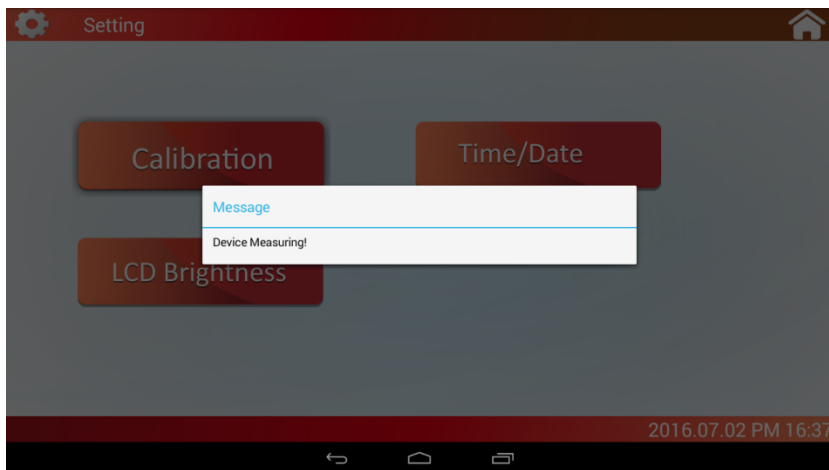
MaestroNano Pro is outstandingly differentiated from others by the easy calibration mode. It is built-in self-adjustable mechanism to maintain the high reproducibility, to keep the stable propagation through the optical path when happening to various level of light intensity after years use and to keep workable in various environment conditions. It is a non-fiber-design system with the rigid optical path. Not like others with fiber-inside-design, which need to make adjustments via experts from time to time to maintain the stability of optical path out of swing fiber or aging. MaestroNano Pro can detect the abnormal conditions such as the defective glass, the deformation of measurement region and the abnormality of light source. All mentioned above will cause to the inaccuracy in blank.

MaestroNano Pro drives the adjustable xenon flash light source to modulate the level of voltage to overcome the fainting light intensity after years use and detect abnormal device by calibration mode in the setting page.

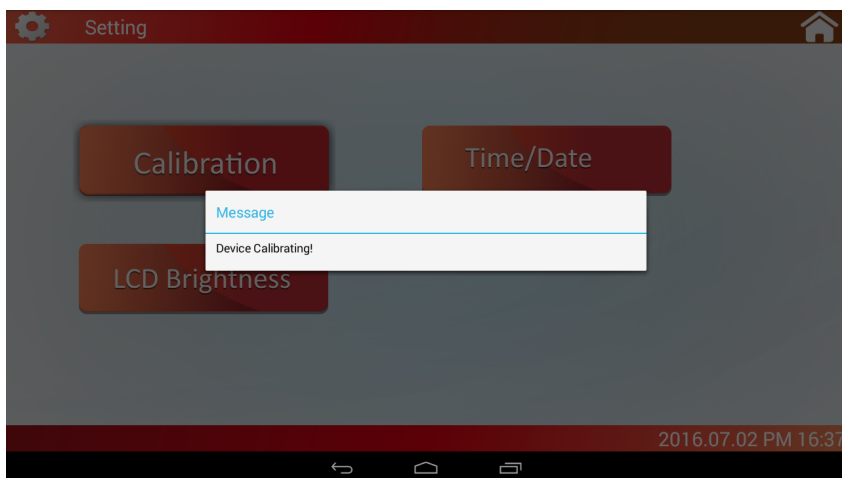
Click on the Calibration button. Pipette two micro-liter of water onto the central area of the bottom quartz glass, then close the metal cover and select "Ok".



After users selecting "OK", MaestroNano Pro will provide a standard intensity corresponding to the voltage curve that can apply to all measurement.



First, MaestroNano Pro detects ddH<sub>2</sub>O as the standard blank. This procedure is to examine whether the optics status is in the same conditions as the default or not. If it is, no need to calibrate. Otherwise, the system will auto-adjust the optical system and show "Device Calibration" at the same time."



After the procedure of calibration, “Calibration Result” reveals the status of optical system and the system will be calibrated back to the standard level, the perfect standard level is 100%-97%. When the calibration result is ranged from 97%-100% , there’s no difference among this reliable section (97%-100%) ;for example, it means 97% as good as 100%. The level from 97%-100% is all accpetable standard default, so it is normal if you see lower % (within 97%~100%) after calibration than before adjustment.

datetime	before(%)	after(%)	situation
2015.11.09 03:35:51	99.422	99.495	pass
2015.11.09 03:41:39	99.358	99.232	pass

Status before adjustment
Status after calibration

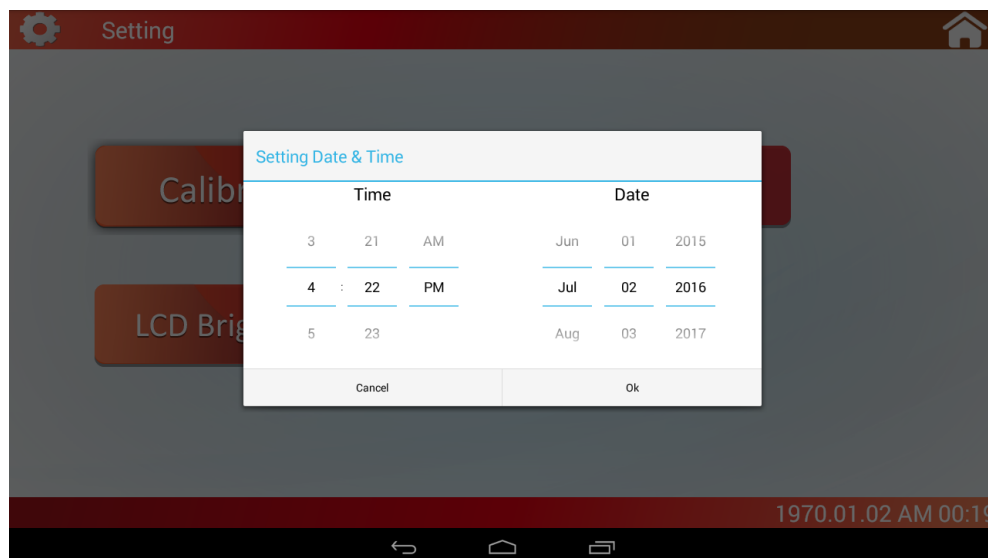
Print

2015.11.09 AM 03:42

In the column “situation”, Pass means that the status of optical system over 97%; If the “situation” shows failure, please re-calibration for as many as three times. After three times of re-calibration, there still shows “failure”. It means that the light source has been damaged, please contact with your local representatives or agents.

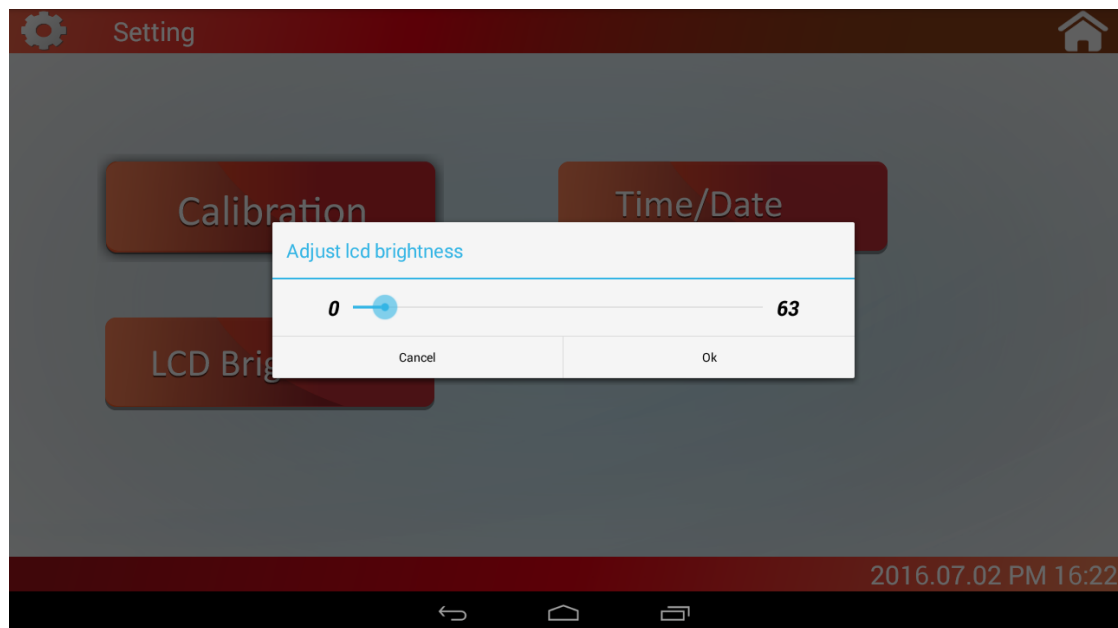
### Time/Date:

Scroll up and down to edit the time and the date.



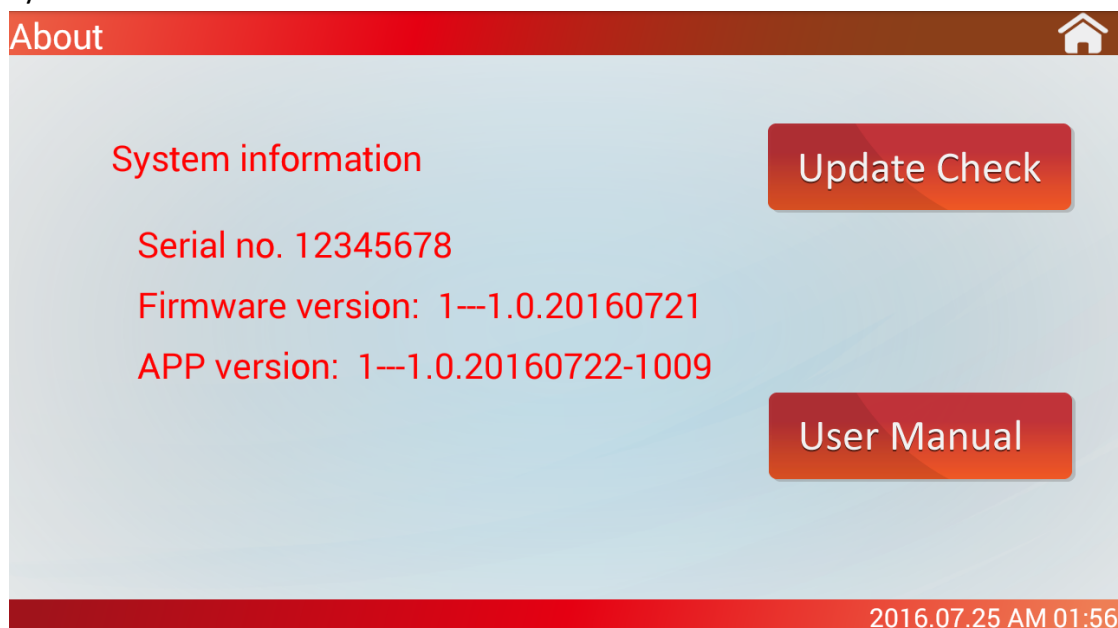
### LCD Brightness:

Touch the button “LCD Brightness” to adjust the LCD, the brightest level of parameter is 63.



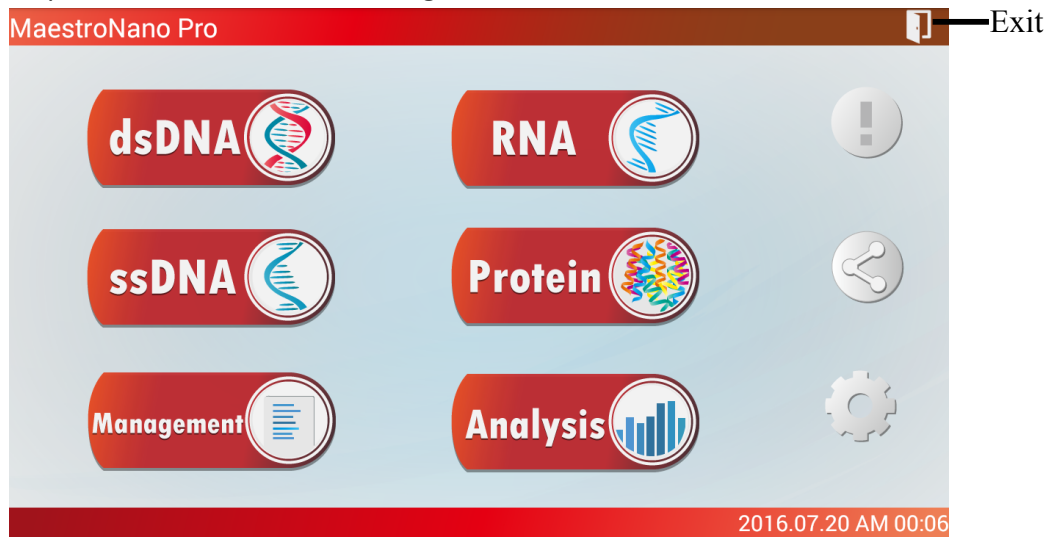
### 7. About

“About” is concerning to the introduction of the instrument, Serial number, App version and firmware version. Maestrogen provides with online-update function to re-new App version if any. Moreover, if the instrument comes out to be abnormal, Maestrogen is able to offer the specific solution in calibration file for online- update by this function.



Before applying to the “Update Check”, users should turn on the Wifi function. To turn on the Wifi , please do the following procedure:

Step 1. Touch the exit button to go back to Android interface.

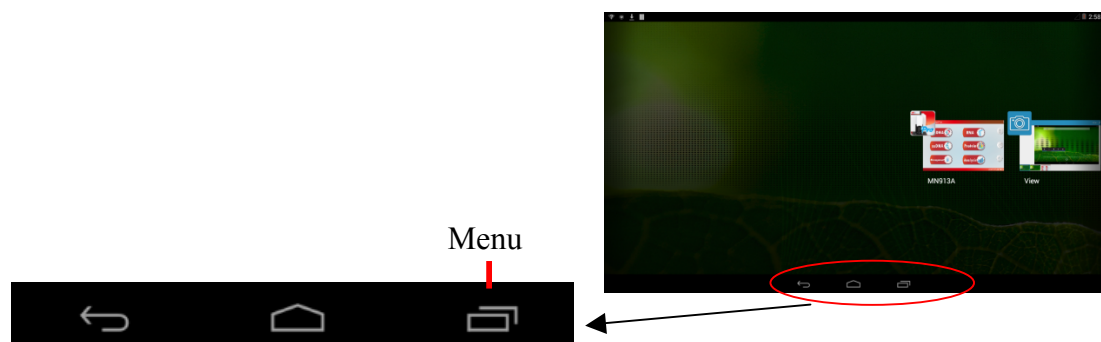


Step 2. Swipe down the screen to find the setting bar.



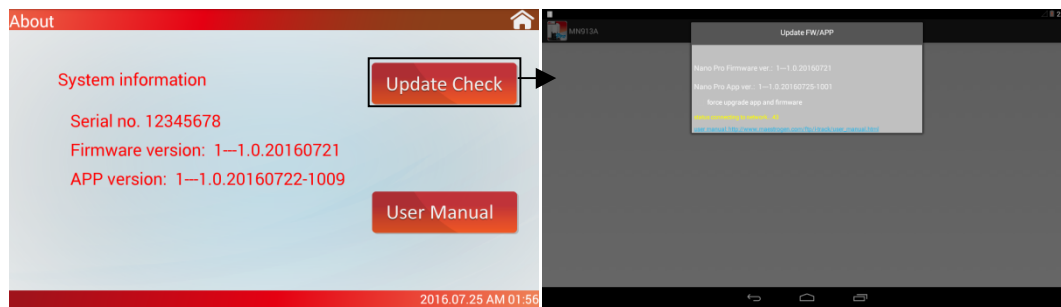
Step 3. Turn on Wifi. See as the above figure.

Step 4. Re-enter MaestroNano Pro App, touch the menu key and click on MN-913A.



When Wifi is turned on , the related functions will be open up, user can update the

system automatically.



## 8. Connect to web server

When Wifi is turned on , users can scan QR code to get into web server, or enter the website in the computer to get the web server.

Web server provides users to download the data files on the smart phone or the computer.



# Maintenance

## Cleaning

Make sure the instrument is in the power-off state and the power cord is disconnected before cleaning the housing of MaestroNano Pro. The instrument is designed with the rigid optical path length combined with the in-house algorithm. Therefore, it is important to keep the surface of base-portion metal plate clean.

MaestroGen suggests that users clean the base-portion metal plate by the soft and lint-free cloth to wipe the surface and do NOT take out the bottom quartz glass. If user needs to pick up the bottom quartz glass, user must cover the paper tape applied to protect the pinhole surface from contamination, fallen dust, or seeping liquids into the pinhole. Furthermore, seeping liquids into the pinhole will cause the variation of optical propagation that have the impact on the accuracy of measurement. Please be careful!

The touch panel and the housing also should be cleaned by a dry and soft cloth, it can also use ethanol as the cleaning solutions but please note NOT to have a puddle of Ethanol on the surface of touch panel or housing, that way will damage the painting of the housing.

In addition, to clean the couple of quartz glasses is very important, especially for the bottom one (i.e. dispensing position). It is better to perform the regular maintenance as precaution to keep the couple of quartz glasses clean after each measuring.

## Troubleshooting and Parts Replacement

If you encounter the following problems, please refer to the suggestion as follows. For further instructions, please contact with your local customer services.

1. The instrument cannot be started up.  
Checking the issues as below:
  - (a) Check if the instrument is using the correct power socket or not.
  - (b) The LED on the adaptor will be lighting, if the adaptor is working.
  - (c) The power switch button should be lighted up to be red, if not, please press the button for a few seconds.
  
2. There is an unstable measurement result.  
The measurement result is abnormal, or the variation is over 10%. :
  - (a) Check if there is a bubble in the droplet.



- (b) Make sure the circle area of the center of Bottom quartz glass is facing forward the right side.
  - (c) Not to use buffer solutions instead of water (ddH<sub>2</sub>O) when users do “Blank” or in the “Calibration” mode in the first boot.
  - (d) Perform several times measurement with the same samples or droplets. If the unstable results come from the luminance deviation from the xenon light lamp, it will get stable by doing “Calibration”.
  - (e) Keep this instrument on a stable, horizontal surface without vibration.
  - (f) Clean the Upper & Bottom quartz glass.
3. The touch panel is in-active.  
Restart the system again. Please contact your local customer service to describe the situation.
4. MaestroNano Pro shows the time error.  
It indicates out of battery. The model type of the battery is CR2032 (3V). Please contact with your local customer services.

#### **Parts of Replacement:**

If MaestroNano Pro is occurred with the problems as below, please contact your local customer service to exchange the problematic parts.

1. If Quartz glass is broken, please contact your supplier to replace it.
2. If the LED is not lighted up, please contact your supplier to replace it.
3. When MaestroNano Pro is measuring, a low voice can be heard frequently. If the measurement result is unreasonable, users can check if the light source is abnormal or not. (Warning: Never open the metal cover when do measuring since the xenon light is firing).
4. MaestroNano Pro is embedded with thermal printer as well as the complimentary thermal paper, and the size of thermal paper is width 57mm. The replacement flow about how to change the thermal paper described as follows:

#### Step 1:

Push the thermal printer exit button to the right to open the printer drawer. The printer cover will open then.



Step 2:

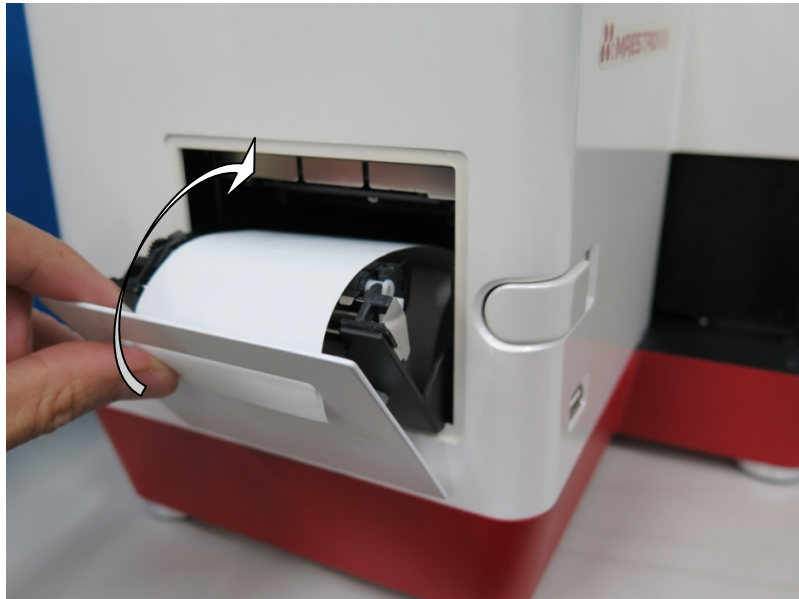
Pull the printer cover and put paper roll into the printer drawer as shown in the below figure.



Step 3:

Fix at one end of the paper, and then “thread” the paper through the output port of the printer cover.





Step 4:

Finally, close the printer cover. Remember not to expose the paper output too much to avoid the waste of thermal paper.



The replacement of paper rolls is completed.

# Appendices

## Calculation Theory

### DNA/RNA

The algorithm of MaestroNano Pro is based on Beer-Lambert Law. Theoretically, the change of optical intensity (I) is adopted to calculate the optical density (O.D.) of the sample solution having a certain optical path length, i.e., the absorbance (A) of light at a specified wavelength that has passed through the sample solution having the optical path length, which may be expressed as:

$$\text{O.D.} = A \equiv -\text{Log}(T) = -\text{Log}(I / I_0)$$

where A is the absorbance of light having passed through the sample solution, T is the transmittance, I and I<sub>0</sub> denote the intensity of light having passed through the sample solution and a reference/blank solution, respectively. Since the absorbance of light having passed through the solution in a quartz tube of 10-mm in width is conventionally used as a reference, the absorbance converted from the optical intensity as measured is normalized using the Beer-Lambert Law based on the 10-mm standard optical path to obtain the absorbance of light having passed through the sample solution having a 10-mm optical path.

According to the Beer–Lambert Law, the dependence of the solution concentration (c) upon the optical path length (P) and the absorbance (A) can be expressed as:

$$c = (A \times e) / P$$

where e is the wavelength-dependent extinction coefficient. For example, the e value is 50ng-cm/μL for double-stranded deoxyribonucleic acids (DNA), 33ng-cm/μL for single-stranded deoxyribonucleic acids, and 40ng-cm/μL for ribonucleic nucleic acids (RNA). The nucleic acid concentration of the sample solution may be calculated according to the absorbance of the standard optical path length (10mm) and the e value. MaestroNano Pro adopts single optical path length with in-house developed algorithms. After measurement, MaestroNano Pro calculates the concentration from the acquired results and embedded algorithms. The embedded algorithms of MaestroNano Pro are verified and calibrated to implant into the integrated circuits for each instrument.

Theoretically, absorbance is proportional to the optical path length. Therefore, users can fit the unknown concentration solution via the in-house algorithms which is generated by each type solution.

## **Protein**

MaestroNano Pro only displays the absorbance at 280nm, the concentration associated absorbance at 280nm (reference concentration), and BSA concentration after the protein sample measured. The absorbance value is normalized to a 10 mm path length.

## **Physical Characteristics of the Light Source**

The Xenon lamp is one kind of gas lighting. The luminance of gas lighting comes with bigger deviations compared to the solid-state light sources if the temperature of gas lighting is not stable, which may have impact on the performance of measurement. If users encounter the unstable measurement, please do blanking for several times after MaestroNano Pro starting up. For any other questions, please contact the local distributors or agents.