# Operation Manual

Version 1.0

# NB-12-0035-27
# Microplate Reader
# PC Software

**Thanks for purchasing our Microplate reader. This Operation manual describes PC software functions and how to operate. Please read it carefully before operation and keep this operation manual for later use.**

## Initial Inspection

Please check the instrument, as well as all included accessories according to the packing list when you first open the packaging, if you find any damaged or missing, please contact distributor or manufacturer.

# Contents

# Chapter 1 Introduction

This microplate reader is an instrument for EIA test, measuring concentration, absorbance, measuring positive or negative reaction between antibody and antigen in samples by reading enzymatic color change – Enzyme Linked Immunosorbent Assay (ELISA).

**Key Features and Benefits:**

1) Easy-to-use controls: 7 inch, color touch screen and 3 external keys.

2) Operating system allows acquisition, editing and saving of data.

3) Can be used independently from a computer, data can be saved and transferred by USB drive.

4) 8 position optical filter wheel; 4 standard optical filters are included, additional optional filters are available.

5) 8 channel vertical optical path, zero dispersion single mode fiber measurement system, automatic plate well center position function.

6) 96-well visual layout allows easy setting of blank, sample, positive/negative control, quality control and multi-value control.

7) Multi-choice tests on single plate.

8) Single or double wavelength measurement.

9) Self-checking optical path, top reading, mechanical motion.

10) Adjustable Plate shaking function, time and speed.

11) Quartz Halogen, energy saving light source.

12) Multiple ports for data export.

13) Measurement results can be exported as .CSV file, compatible with MS Excel.

# Chapter 2 Features

**Operating conditions:**

Ambient operating temperature: 4°C ~ 45°C

Relative humidity: ≤70%

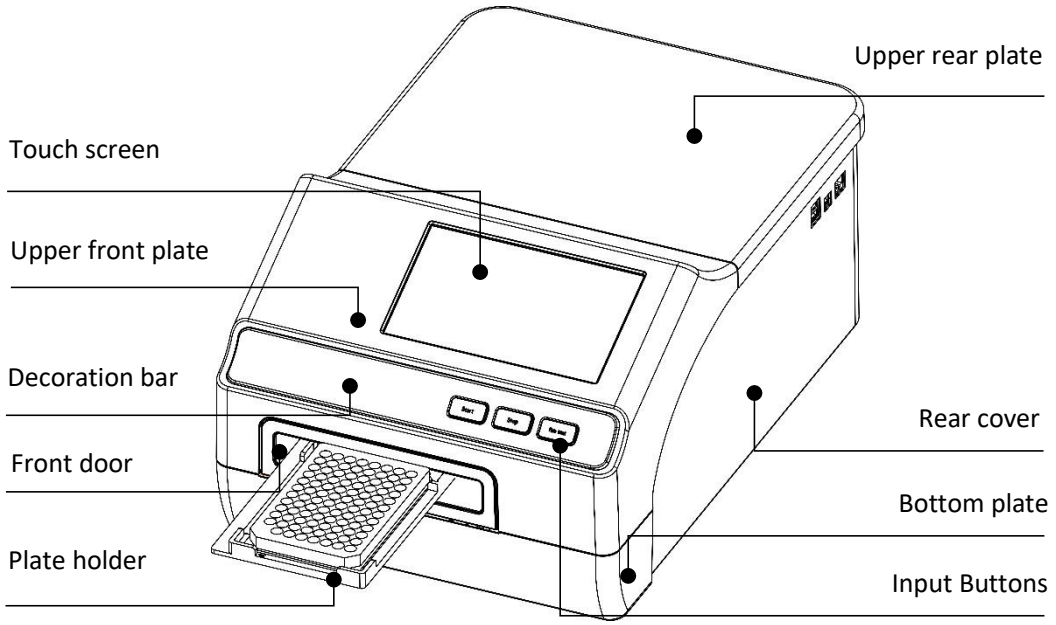
Input power: AC100～240V 50/60Hz 2A

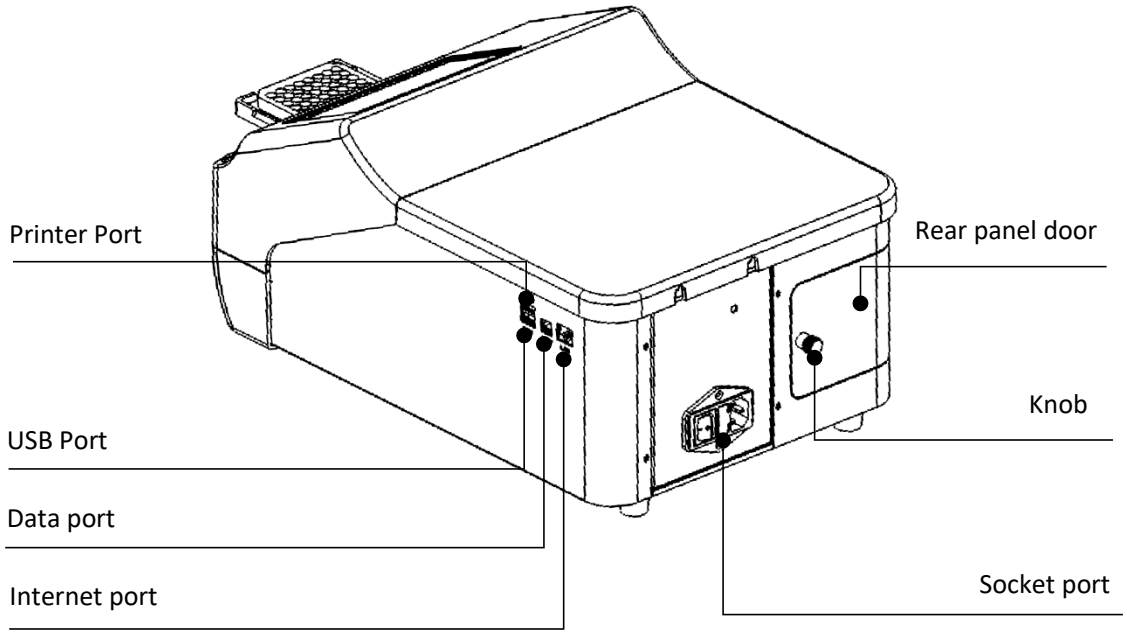
| Model / Parameter | Microplate reader |
|---|---|
| Light source | 6V, 10W, Quartz-Halogen lamp |
| Light source est. life | 300 hours |
| Wavelength | 400～750nm |
| Optical filter | Four standard filters included: 405,450,492,630nm. Filter wheel holds up to 8 filters. |
| Detector Type | Silicon photodetector |
| Read-out range | 0.000-4.000 Abs |
| Resolution | 0.001Abs |
| Linearity | ±1% ( 0~2.000A) , ±2% (2.000~4.000A) |
| Precision | CV≤0.2% (0-3Abs); CV≤1% (3-4Abs) |
| Accuracy (450nm) | ±0.005Abs (0 ~2.0 Abs)，±1% (2.0~3.0 Abs)，±1.5% (3.0~4.0 Abs) |
| Channel deviation | <0.01Abs at 450nm |
| Measurement Speed | Single wavelength <15s/96well plate, double wavelength <28s/96well plate (Normal speed setting) |
| Dimension (WXDXH) | 295x440x225mm / 11.5x17x9 inches |
| Weight (kg) | 10kg |

# Chapter 3 Instrument Overview

Before first use of this instrument, please read this chapter carefully.

**Structure**



There are three input buttons: “Start” ”Stop” and “Plate in/out”

USB Ports: For connection of keyboard, mouse and USB drive. (the upper port is for printer connection)

Data port: for PC connection. (contact Neo Biotech or distributor for updated software and features)

Internet port: for PC connection. (contact Neo Biotech or distributor for updated software and features) Rear door panel: can opened to replace light source and access optical filter wheel.

Knob: To lock and unlock the rear door.

# Chapter 4 Software Installation

## Section 1 Installation Environment

Operation system: Windows7, 64byte, as Fig 1.

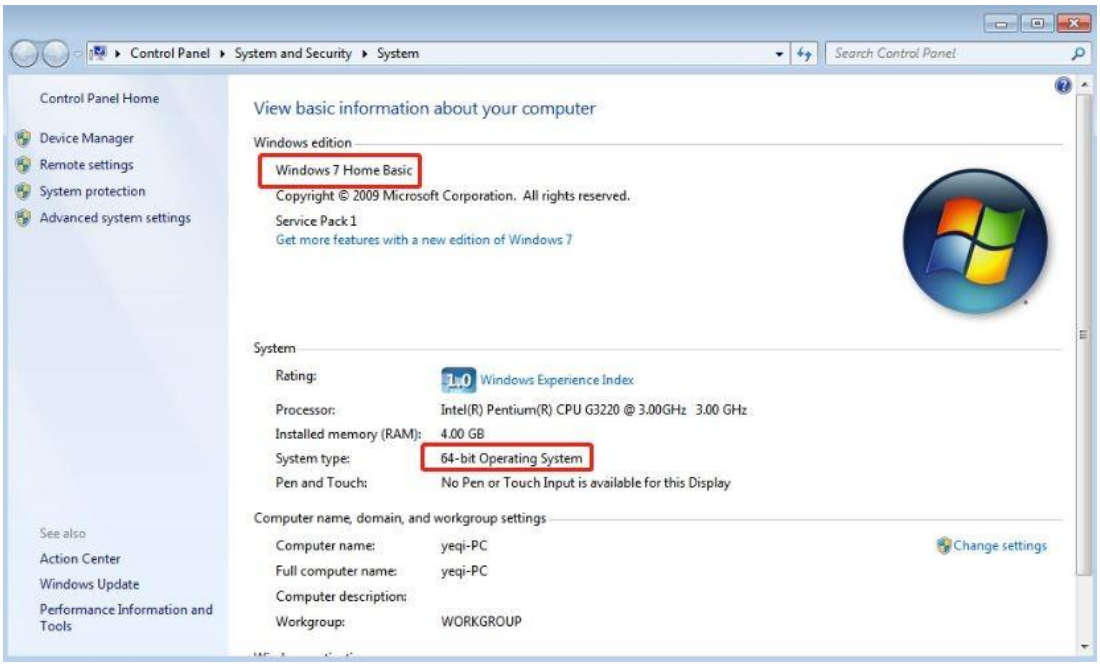



Fig 1

## Section 2 Installation Procedures

### 2.1 Software Installation

1. Click icon AMR-100.exe .
2. Choose installation path way, then click “Next”, as Fig 2.

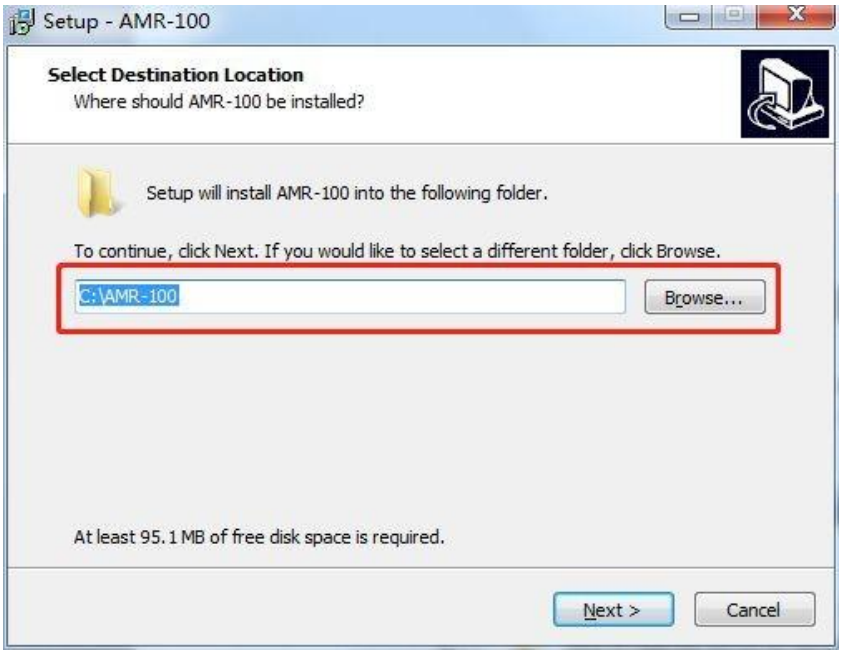



Fig 2

3. Please choose “Create a desktop shortcut” if needed, as Fig 3.

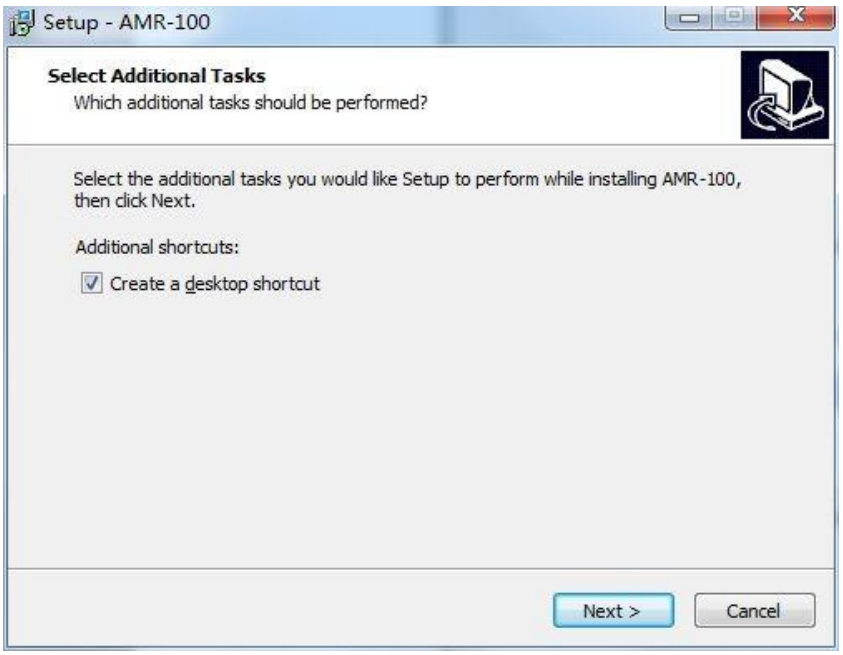



Fig 3

4. Then “Next” to installation interface as Fig 4 and 5.

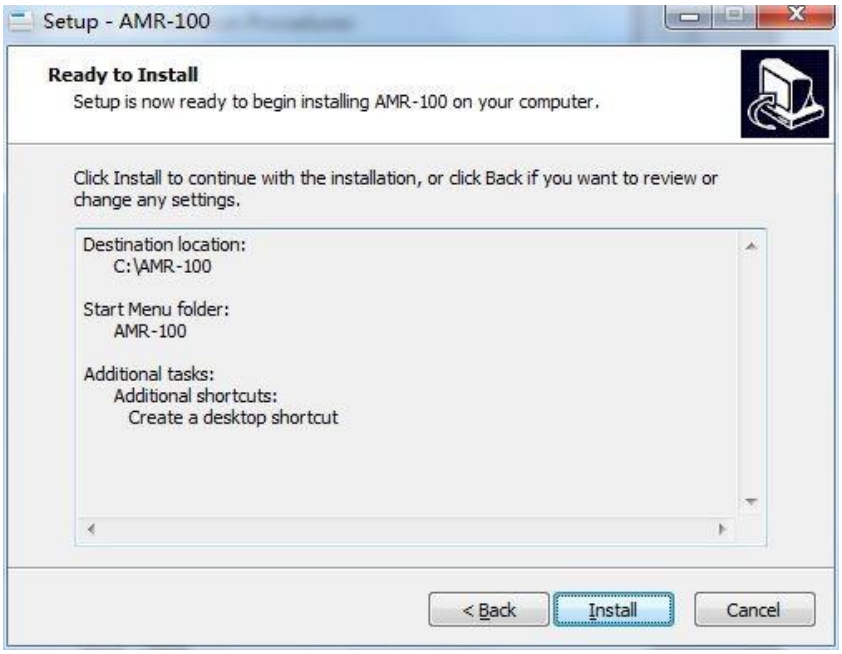



Fig 4

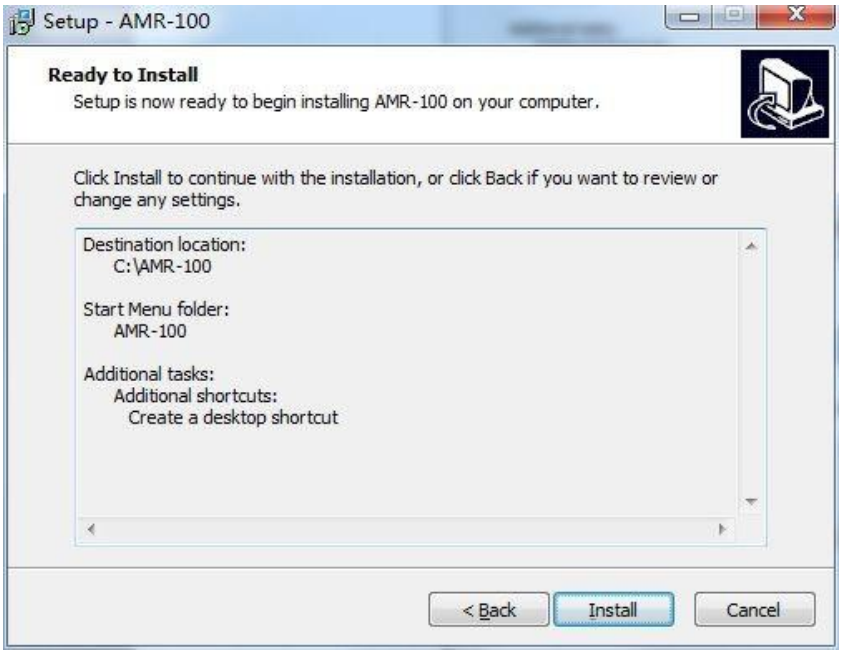



Fig 5

## 2.2 Environment Installation

1. Interface of environment installation will pop out after the above installation finished, choose “I agree to the license terms and conditions” then click “Install” to next step, as Fig 6.

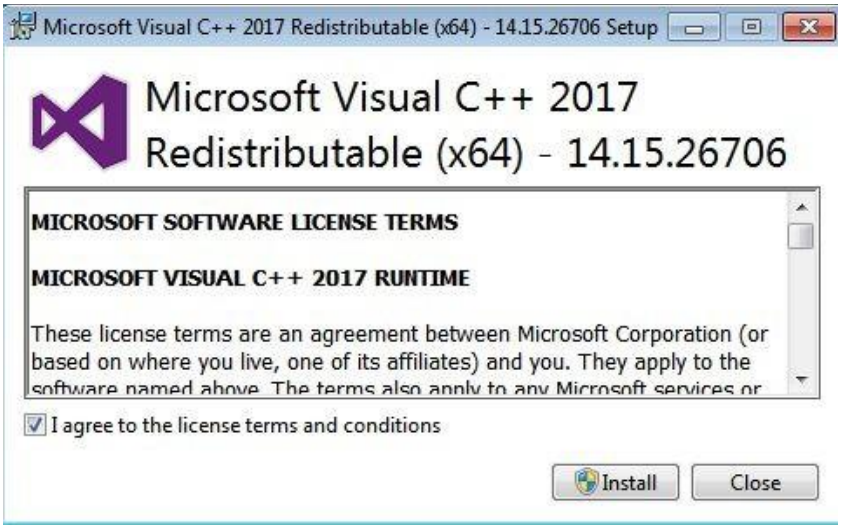



Fig 6

2. Then click “Install ” to enter interface as Fig 7 and Fig 8 below.

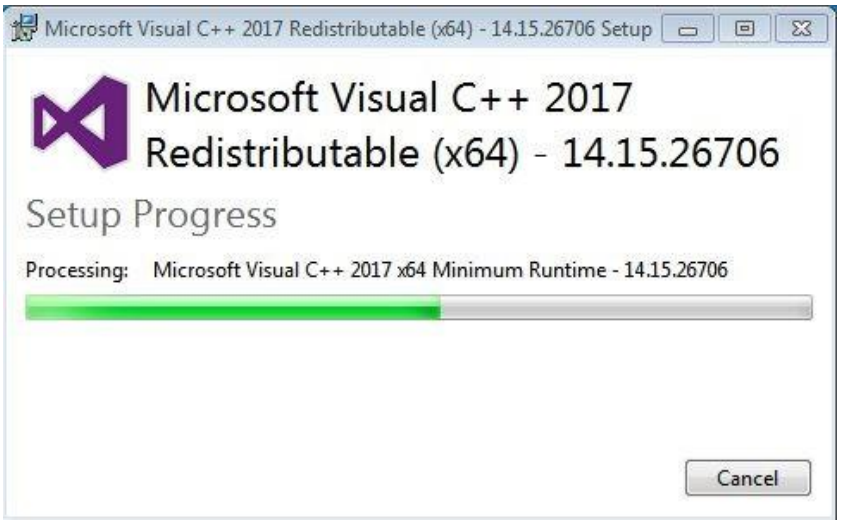



Fig 7

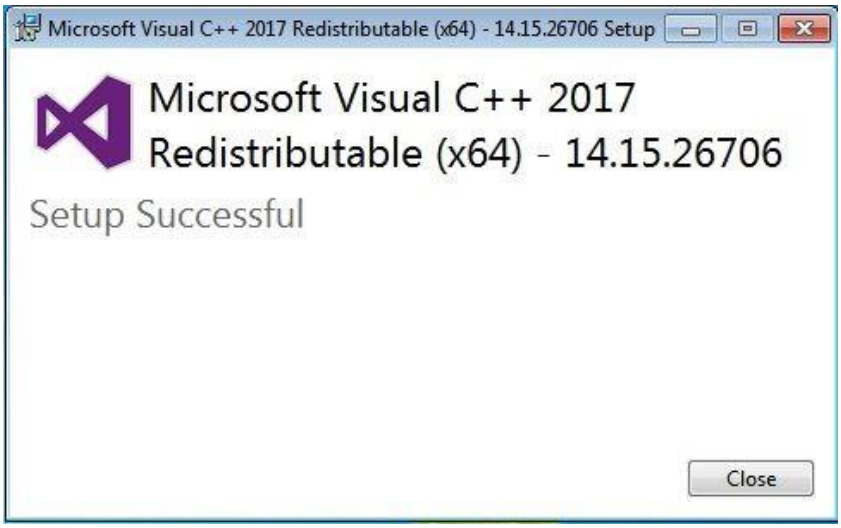



Fig 8

3. Please confirm if the installation is successful in “Control Panel” which path is “control board”→ “Programs”→ “Programs and Features ” as highlighted in Fig 9.

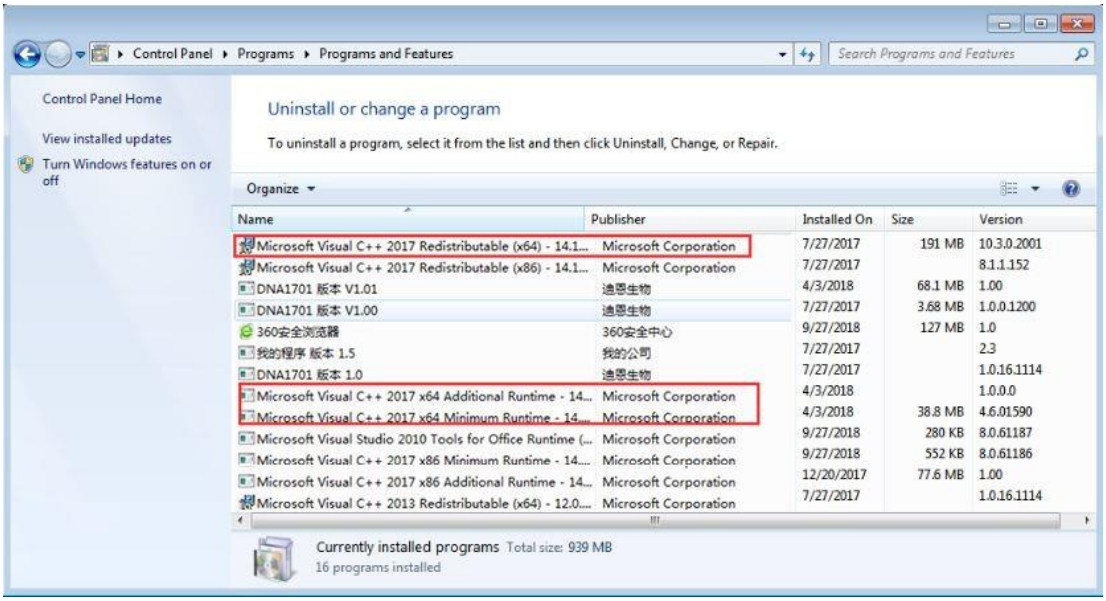



Fig 9

## 2.3 DriverSetup Installation

1. DriverSetup(X64) will pop out once the above installation finished, as Fig 10.


Fig 10

2. Click “INSTALL” and then the interface will pop out as Fig 11.

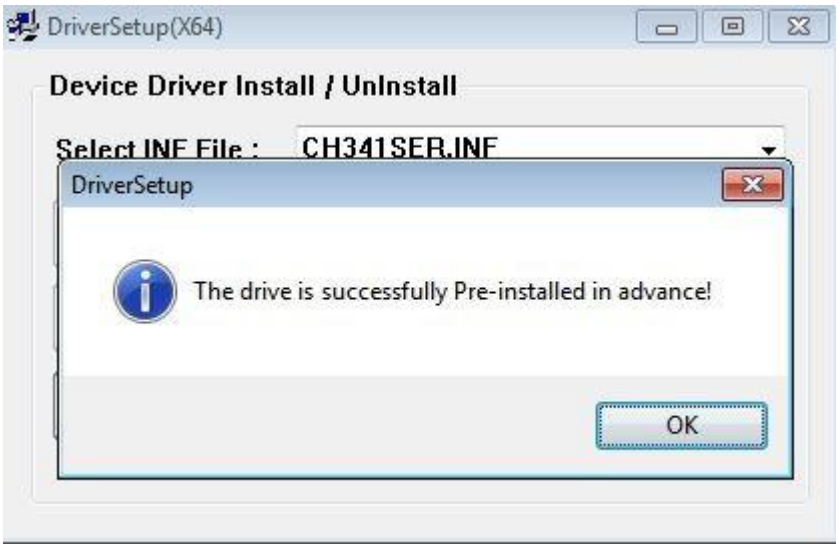



Fig 11

*Attention: This software maybe can not work properly if there is any Chinese character in the path or the path is too long.

# Chapter 5 Operation Instruction

## Section 1 Startup Interface

Startup interface as below Fig 12.


Fig 12

1. Load and verify required resource files.
2. Animations presentation.
3. Check the connection and acquire basic information.
4. Automatically match the proper port during the connection.
5. Jump to the next interface.

# Section 2 Main Interface

Detecting interface as Fig 13 which is composed by 8 parts, please see below table.

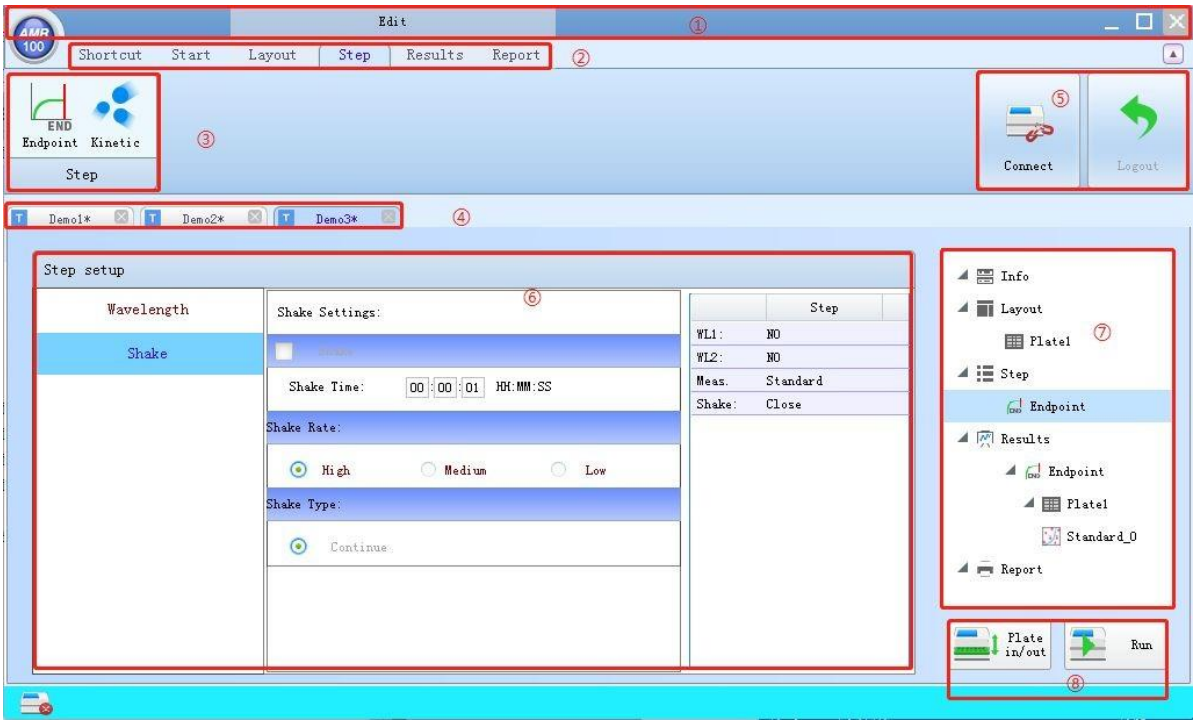



Fig 13

| No. | Name | Function |
|---|---|---|
| ① | Title | Including three functions: minimization, maximization and shut off. |
| ② | Menu | Switching among "Shortcut", "Start", "Layout", "Step", "Results" and "Report" |
| ③ | Toolbar | Sub-bar of the Menu |
| ④ | Protocol | Switching among protocols |
| ⑤ | Status | Control connection with Microplate Reader |
| ⑥ | Parameter info. | Displays setting information and results |
| ⑦ | Protocol tree | Including "Info", "Layout", "Step", "Results" and "Report". |
| ⑧ | Control bar | Controlling plate in/out and protocol running |

## 2.1 Title

This part including three functions : minimize, maximum and shut off.

## 2.2 Menu

Please see below table:

| Content | Function |
|---|---|
| Shortcut | Including "New", "Open", "Save" and "Export". |
| Start | Including "New", "Open", "Save", "Save as", "Settings", "Language"and "Help". |
| Layout | Click to Layout interface |
| Step | Click to Step interface |
| Results | Click to Result interface |
| Report | Can export report in excel format. |

## 2.3 Toolbar

For protocols operation, like "Demo1" "Demo2" "Demo3" etc.

## 2.4 Protocol

Displays opened protocols, Demo1, Demo2 and Demo3 are three default protocols.

## 2.5 Status

Two buttons included: “Connect/Disconnect” and “Logout”, if click “Connect” in the main interface, it will connect to the Microplate Reader.

*** Remark: If connected, both “Disconnect” button in the upper-right corner and**  **in the lower-left corner will appear, or “Connect ” and**  **will appear when instrument disconnected.**

## 2.6 Parameter info.

Including setting information and results.

## 2.7 Protocol tree

Displays the current protocol and newly added steps.

Click protocol tree can switch to selected steps quickly.

## 2.8 Control bar

Including two buttons “Plate in/out” and “Run”.

# Section 3 Information

It will enter into detection interface which including “Info”, “Layout”, “Step”, “Results” and “Report” after the software started, “Info” is the default interface as Fig 14.

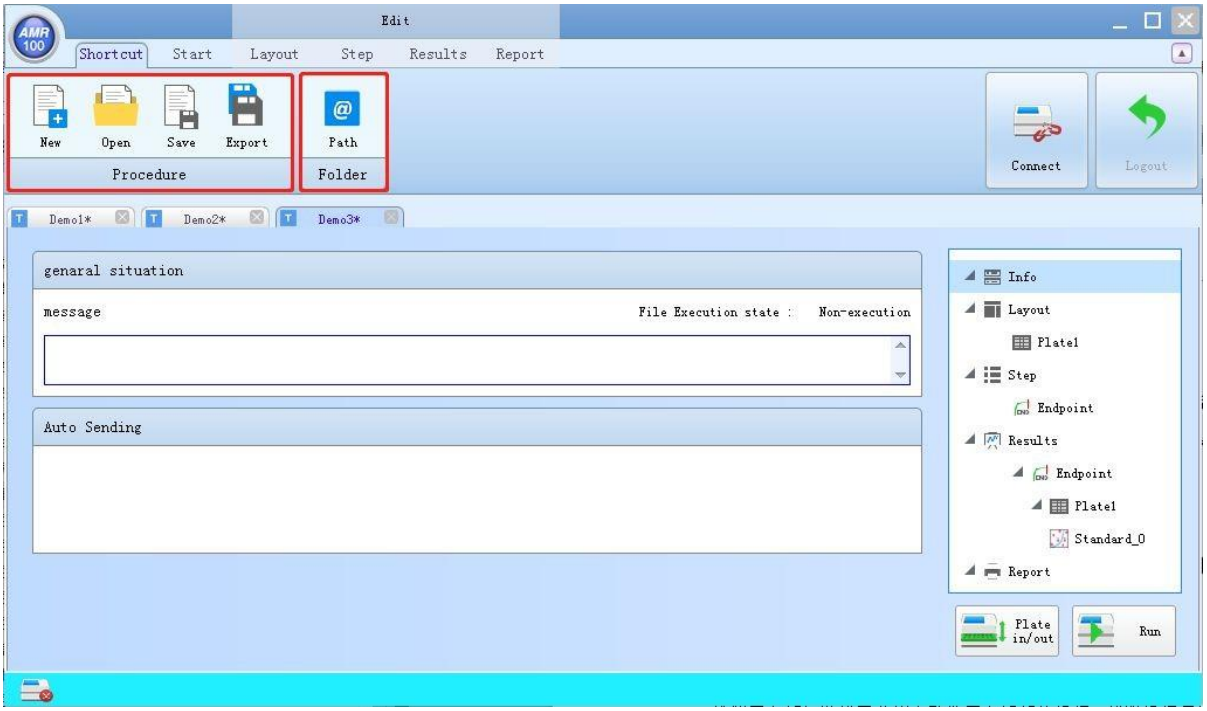



Fig 14

Info interface is composed by two parts: shortcut and start, mainly includes “New”, “Open”, “Save”, “Export”, “Path” “System” etc.

## 3.1 Document Management

### 3.1.1 New

Click “New” in “Shortcut” or “Start” to create a new protocol as Fig 15 below.Only protocol that without test data is with icon T, protocol that with test data is without icon T.

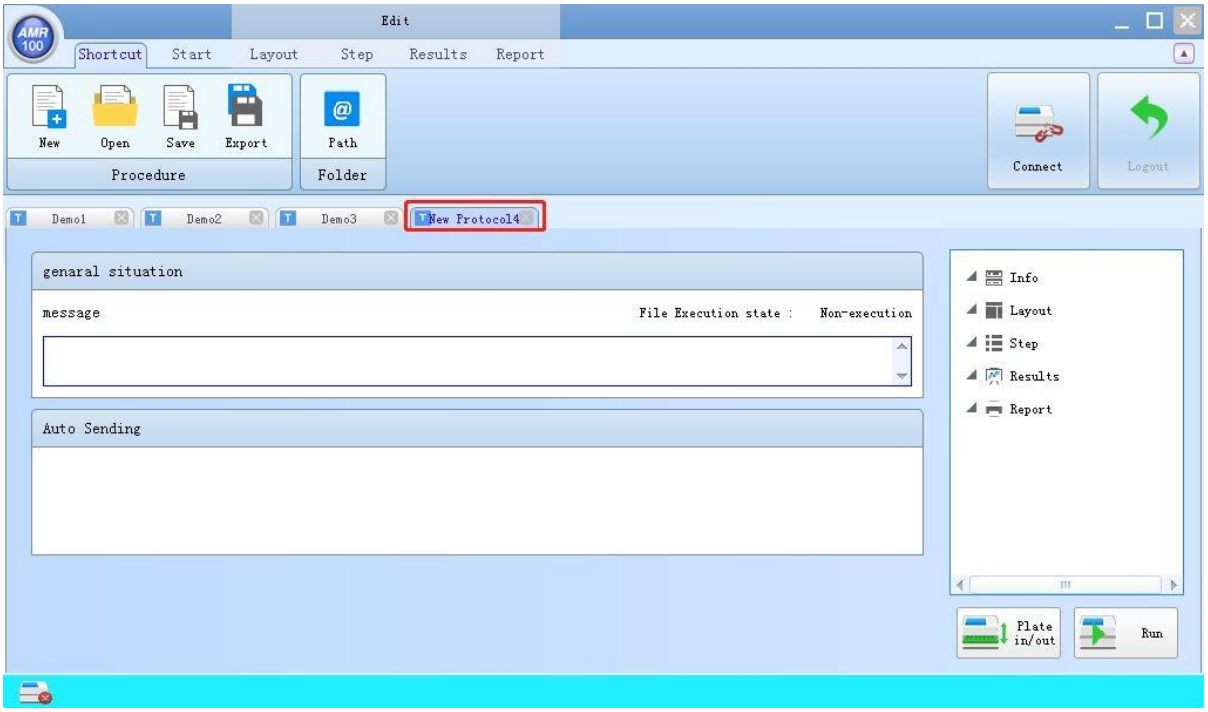



Fig 15

### 3.1.2 Open

Click “Open” in “Shortcut” or “Start”, default path is “Pro_Save” file under installation directory as Fig 16.

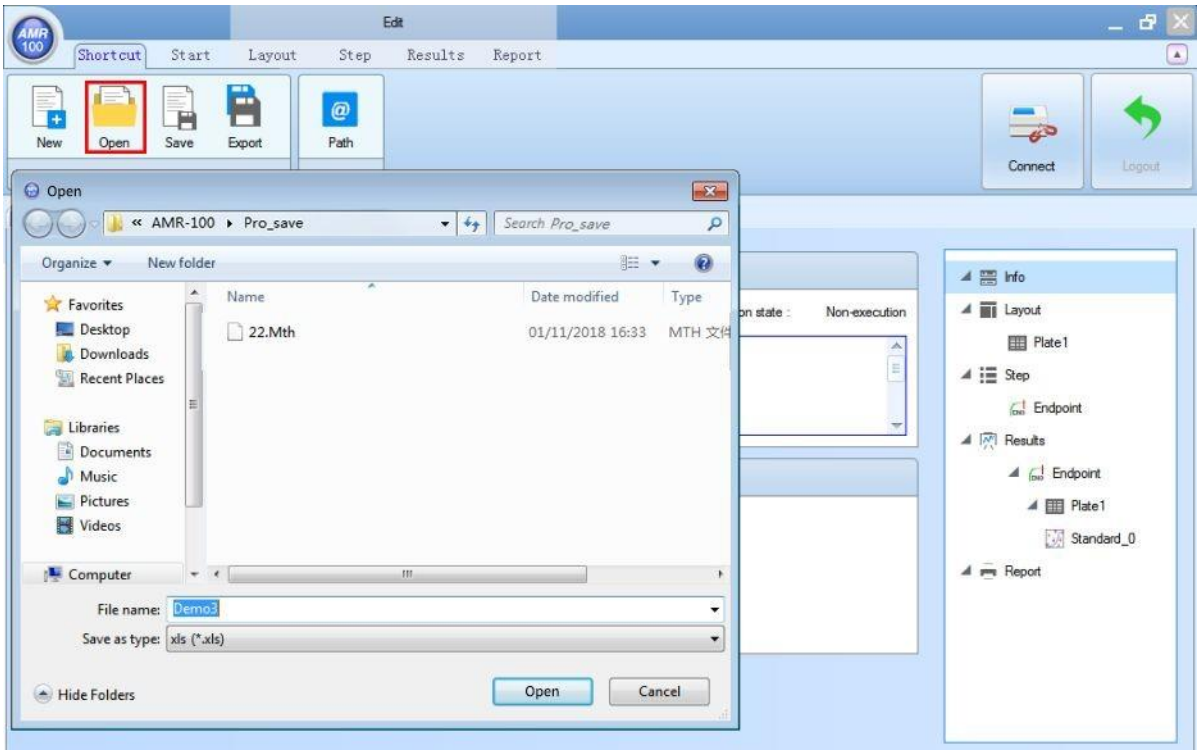



Fig 16

### 3.1.3 Save

- Save files by “Save” or “Save as” button, default path is “Pro_Save” file under installation directory

which is also can be changed as Fig 17.

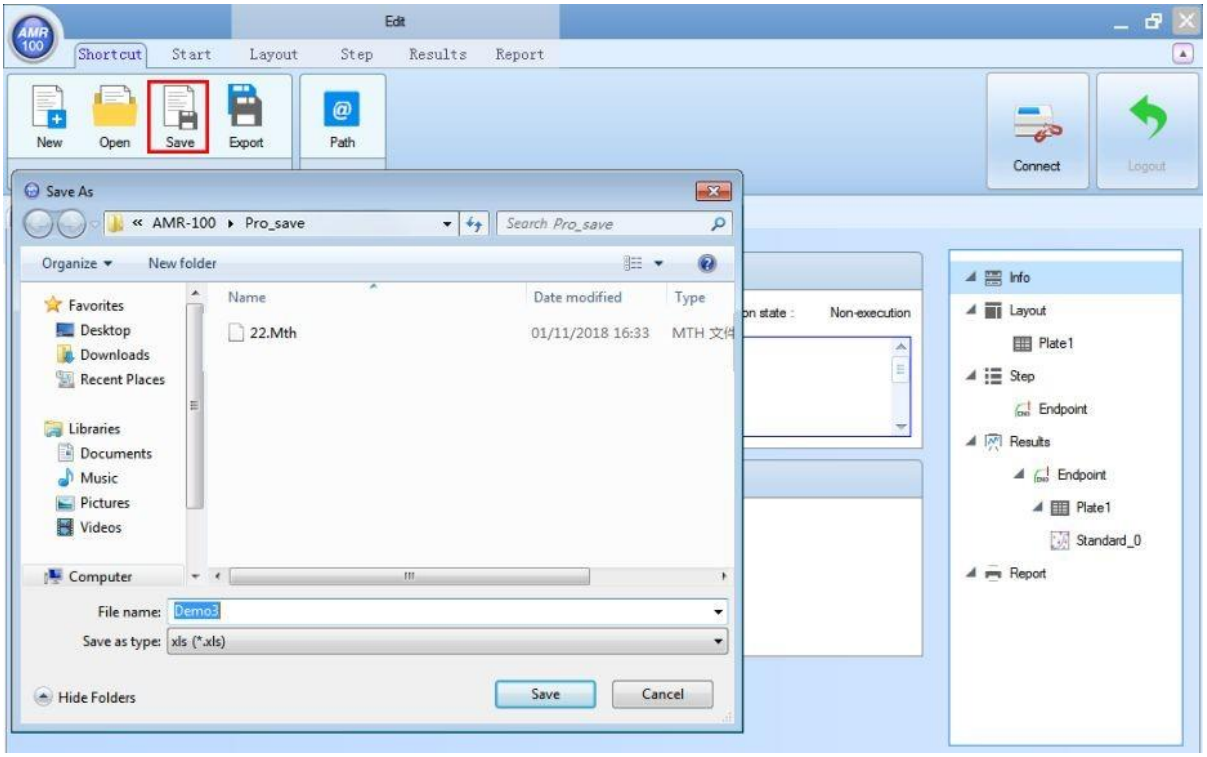



Fig 17

- Click “Save” in “Start” menu, protocol saved in “Pro_Save” file in installation director, then click “OK” to finish. Please note: the saving path can not be changed.

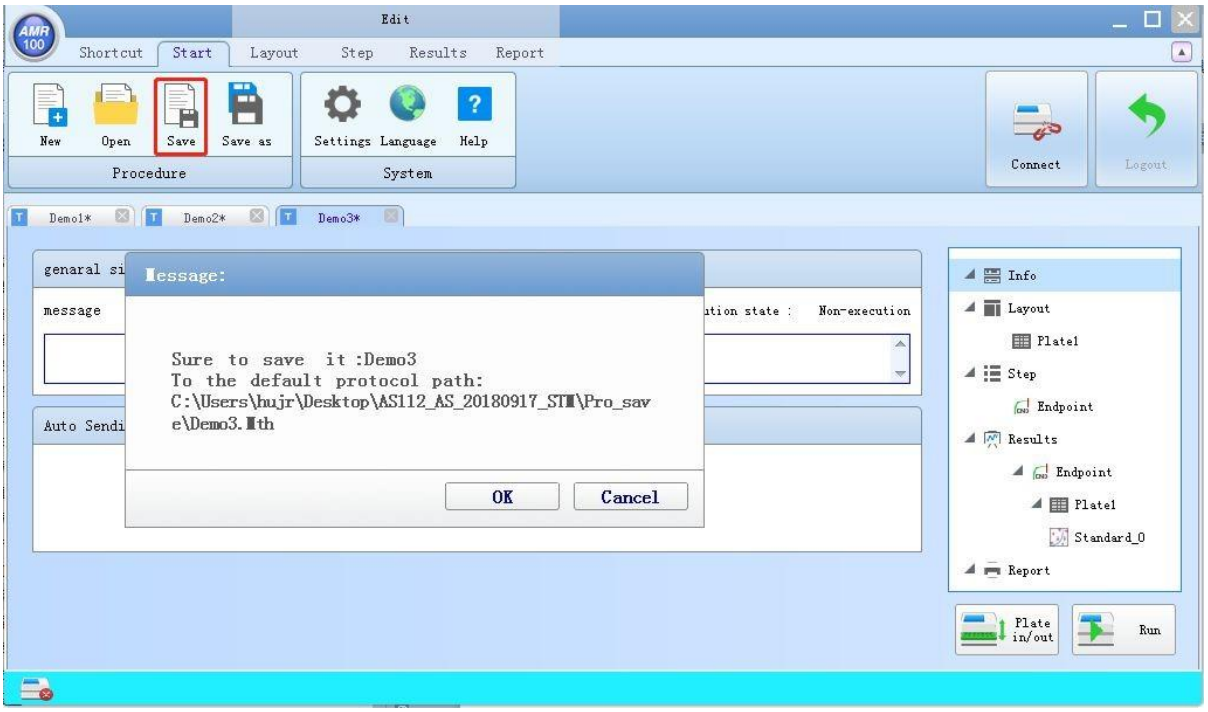



Fig 18

### 3.1.4 Export

Click “Export” in “Shortcut” menu, default export path is “EXCEL_save” file in installation directory, the path can be changed as Fig 19.


Fig 19

### 3.1.5 Path

- Click “Path” button to open the path of the last time exporting as Fig 20.


Fig 20

## 3.2 System settings

### 3.2.1 Settings

The absorbance and concentration can be set, only for their decimal place(Default value of absorbance is three decimal while two for concentration), as below Fig 21.

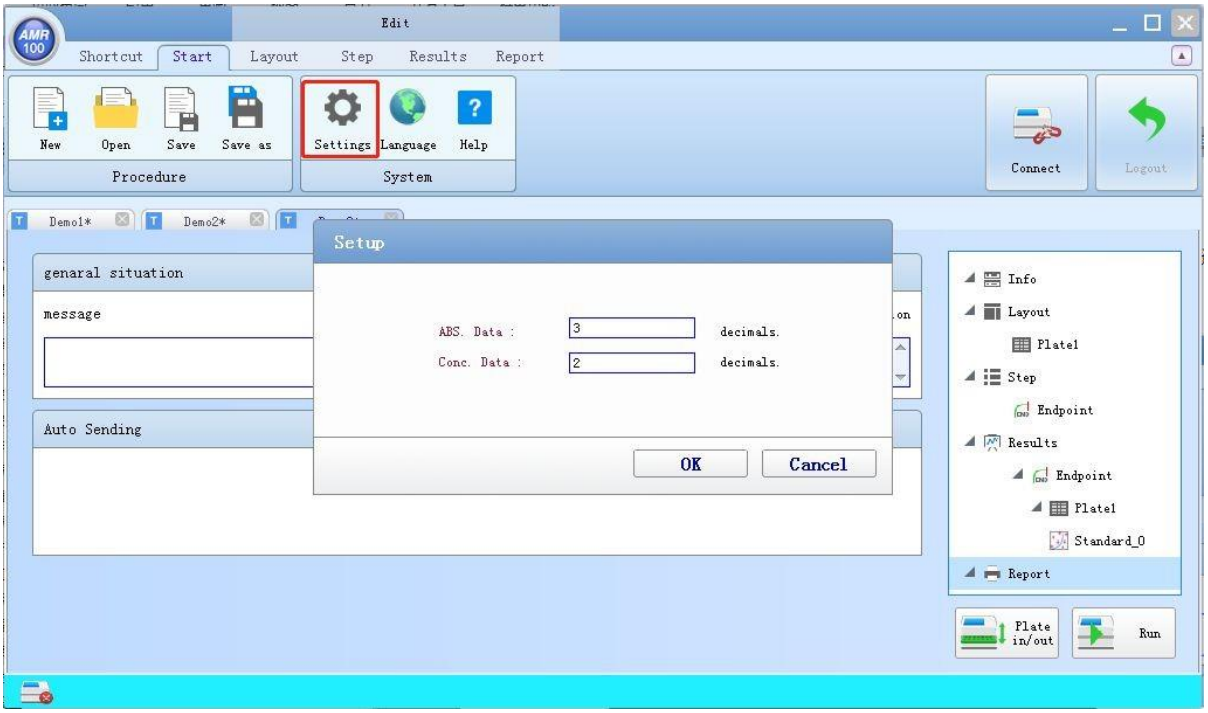



Fig 21

### 3.2.2 Language

Language can be switched between Chinese and English. Restart needed once language changed.

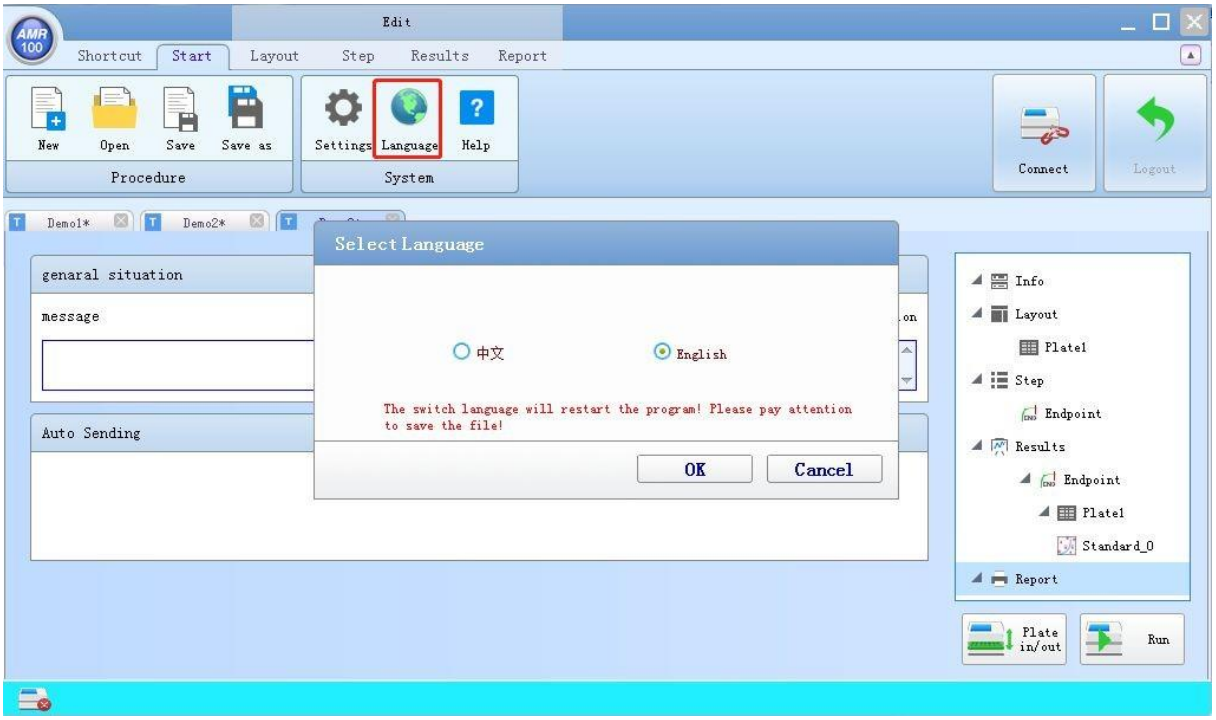



Fig 22

# Section 4 Layout

## 4.1 Layout Parameters

Two options in Layout interface: “New” and “Delete”. For now only one 96-well plate allowed to be newly added.

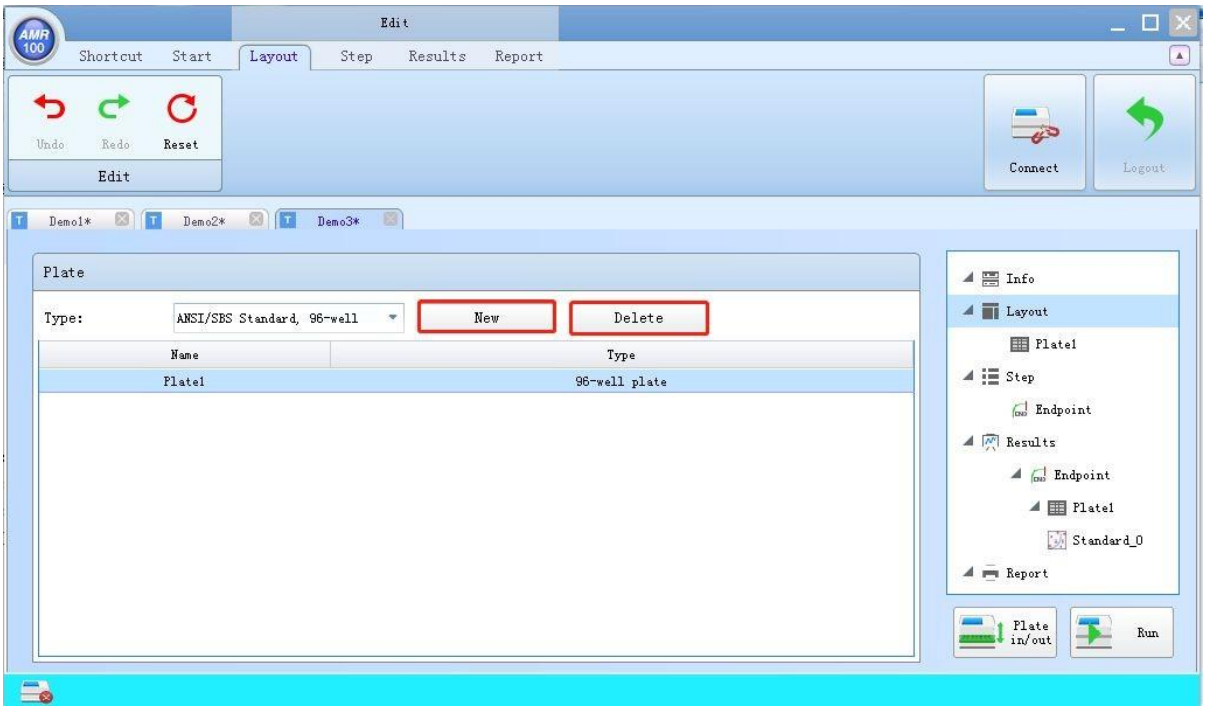



Fig 23

## 4.2 Plate layout parameters information

1) Plate layout interface is composed by two parts: “Plate Layout” and “Type”(as Fig 24). “Plate” button is for positions layout while “List” for protocol list and result list, see below Fig 25 and Fig 26.

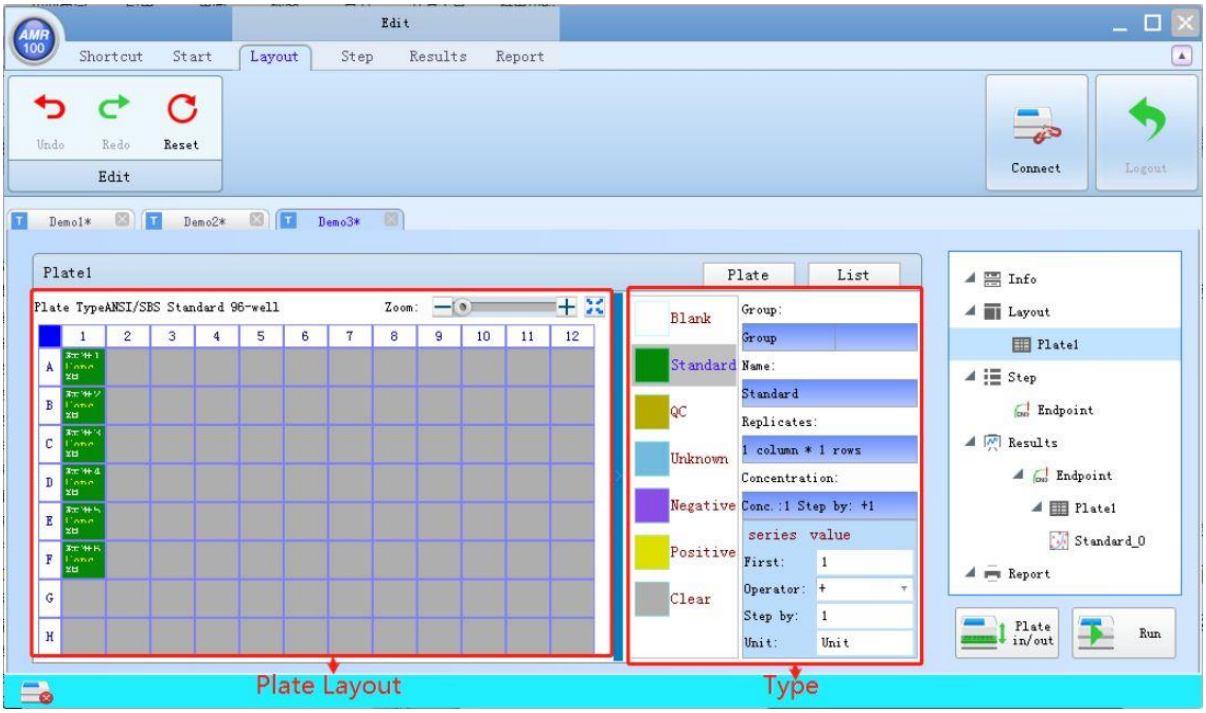



Fig 24

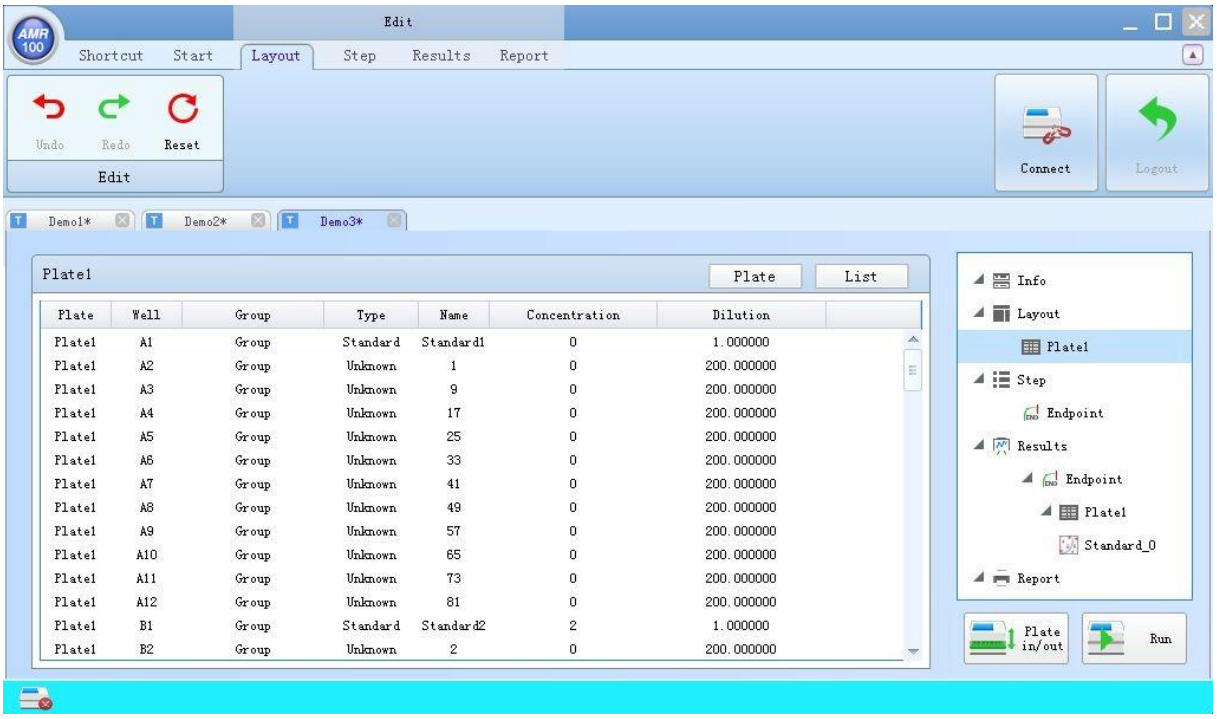



Fig 25

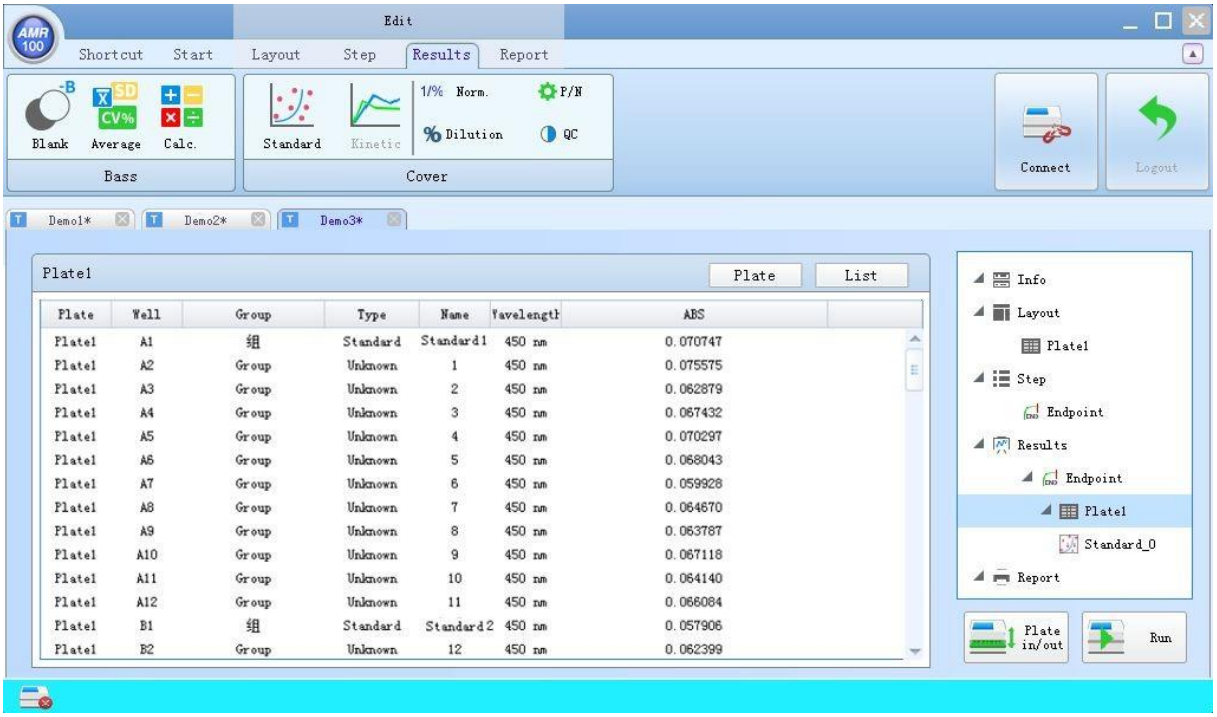



Fig 26

2) Plat layout setting: in the “Layout” interface, choose the type needed, the button will turn gray(as Fig 27), then click wells in “Play Layout” area. If the type of a well need to be changed, choose clear first, then change the corresponding well. There are 7 types of well: Blank, Standard, QC, Unknown, Negative, Positive and Clear.

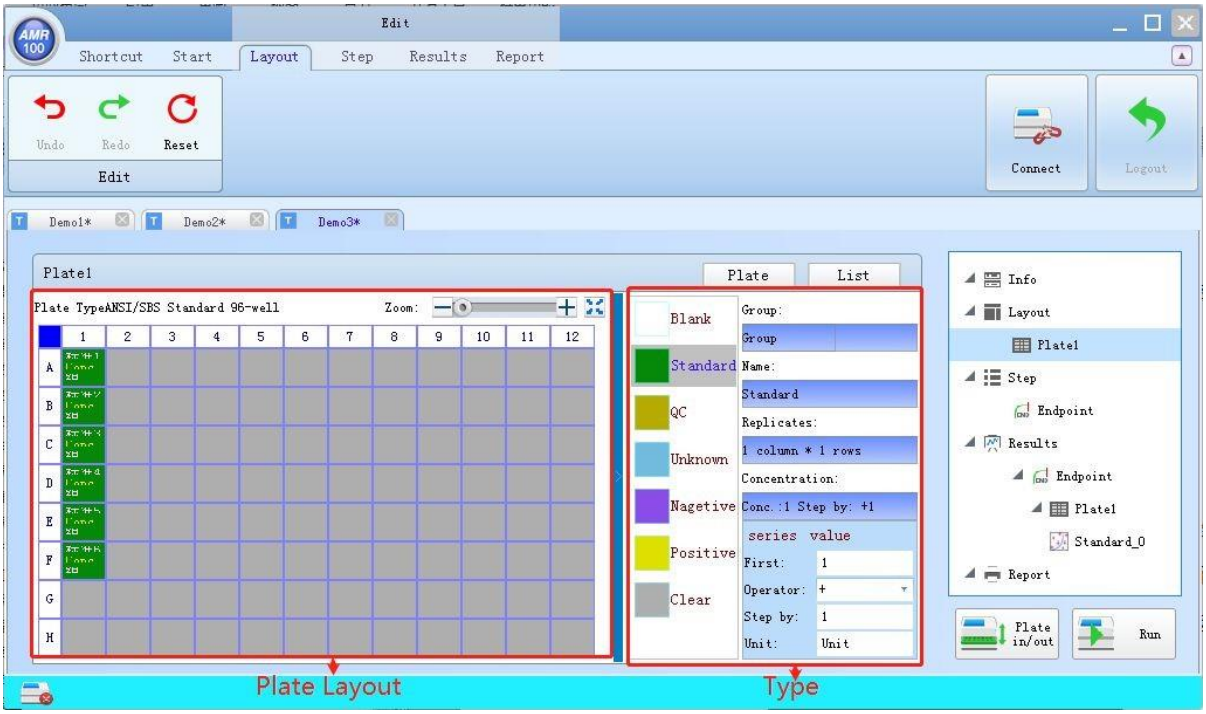



Fig 27

3) About plate type:

Blank: used for blank control, you can set several wells as blank.

Standard: Standard sample well in dark green are for setting standard curve, you can set several wells with the same number of standard sample, operator can be “+”, “-”, “×”, “÷” and “ step by” can be any integer as Fig 28.

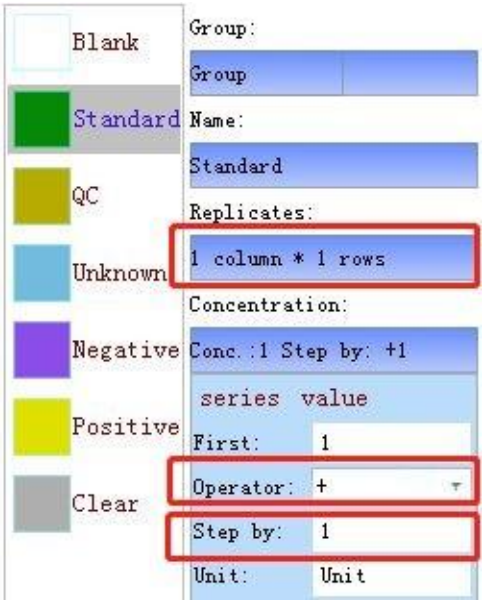



Fig 28

QC: QC control positions are in dark yellow, the setting procedure is the same as that for standard sample position.

Unknown: In light blue, several positions can be set as unknown. Click the right place of the “Unknown” button, it can be named freely, the prefix part can accept numbers, letters, even Chinese characters, but for the suffix part, only numbers accepted(except 0). Dilution ratio also can be set, default value is1:200 as below Fig 29.

**Remark: If sample dilution ratio changed, all sample positions dilution ratio in plate layout also will be changed.**

Negative: Negative control position in purple, you can set several positions as negative control.

Positive：Positive control position in light yellow, also several positions can be set as positive control.

Clear：positions in gray without samples.

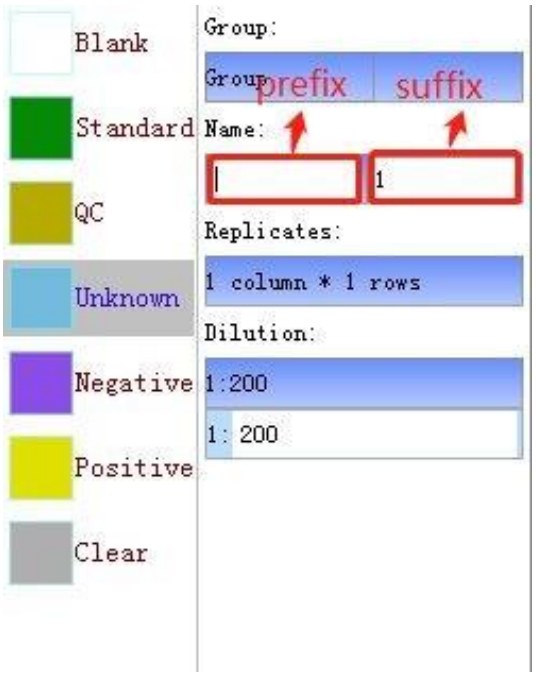

Blank
Standard
QC
Unknown
Negative
Positive
Clear
Group:
Group
prefix
suffix
Name:
1
Replicates:
1 column * 1 rows
Dilution:
1:200
1: 200

Fig 29

# Section 5 Step

"Step" interface as below:

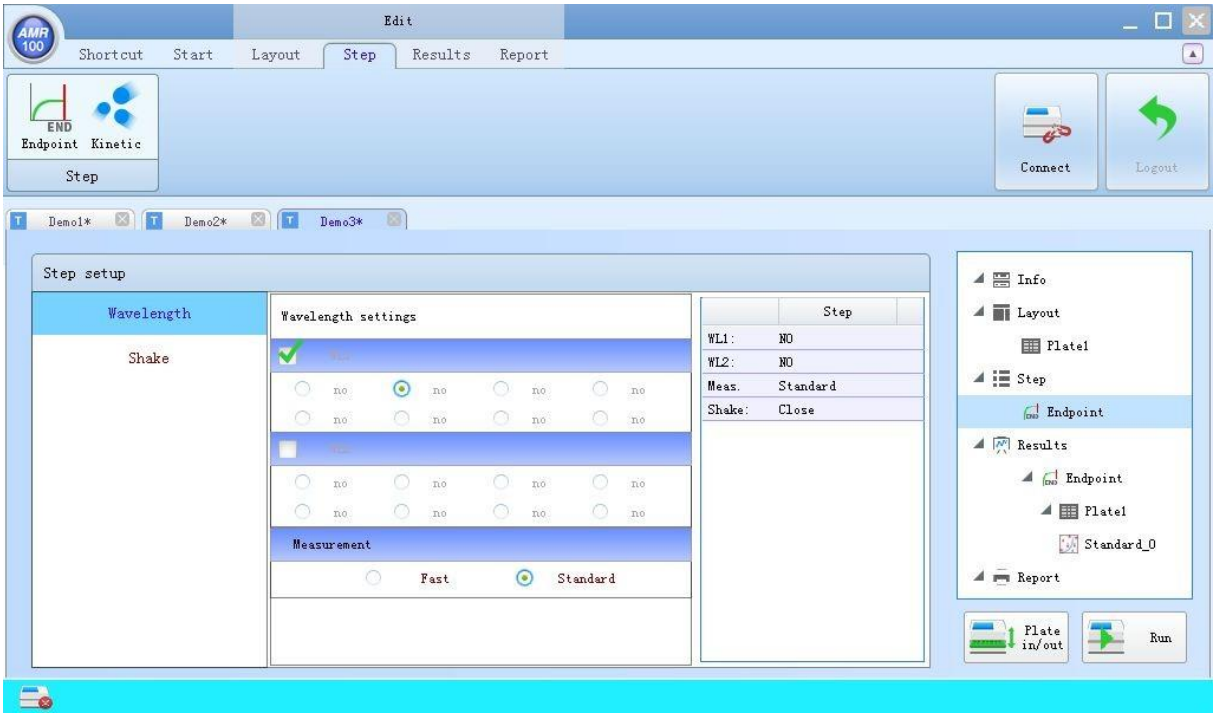



Fig 30

## 5.1 End-point method

End-point method including two sections: Wavelength and Shake as Fig 31, Fig 32 below.


Fig 31

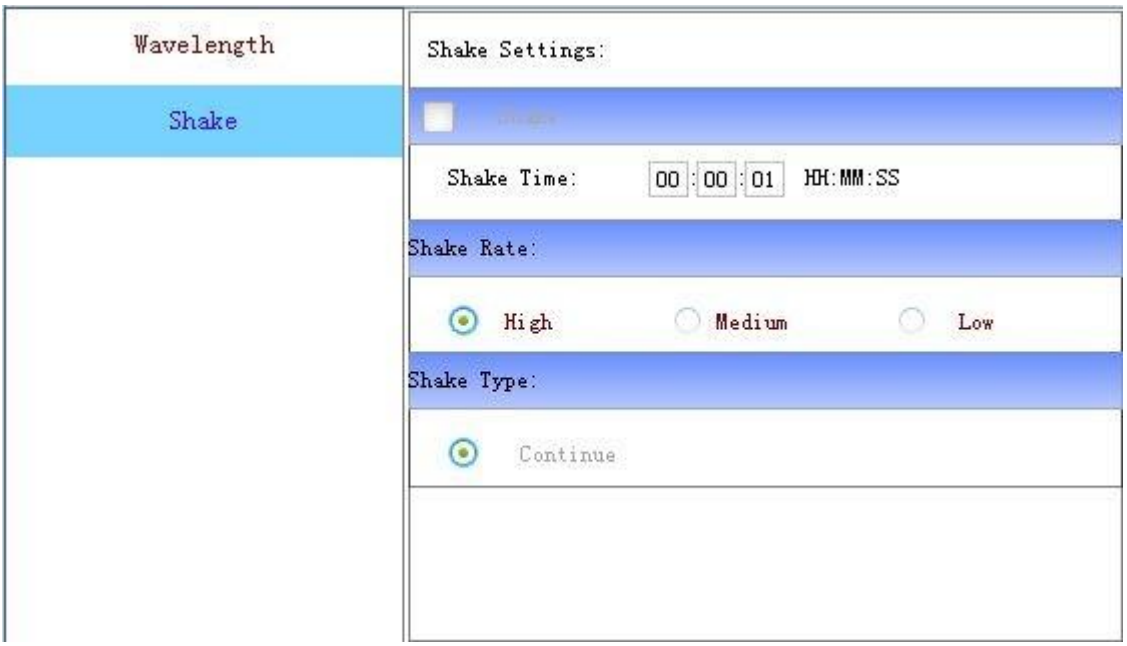



Fig 32

Note: "WL1" and "WL2" can not be with the same wavelength simultaneously.

# Section 6 Results

Result interface as below Fig 33.

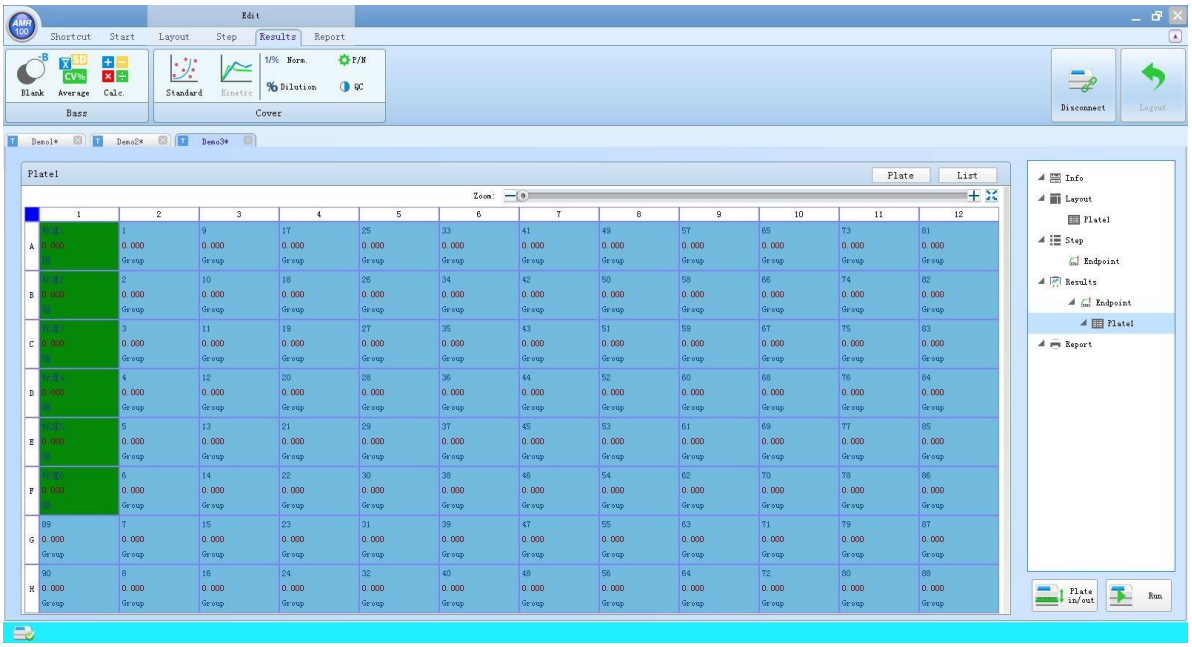


Fig 33

## 6.1 Standard Curve

Click “standard curve” in protocol tree to enter into standard curve interface.

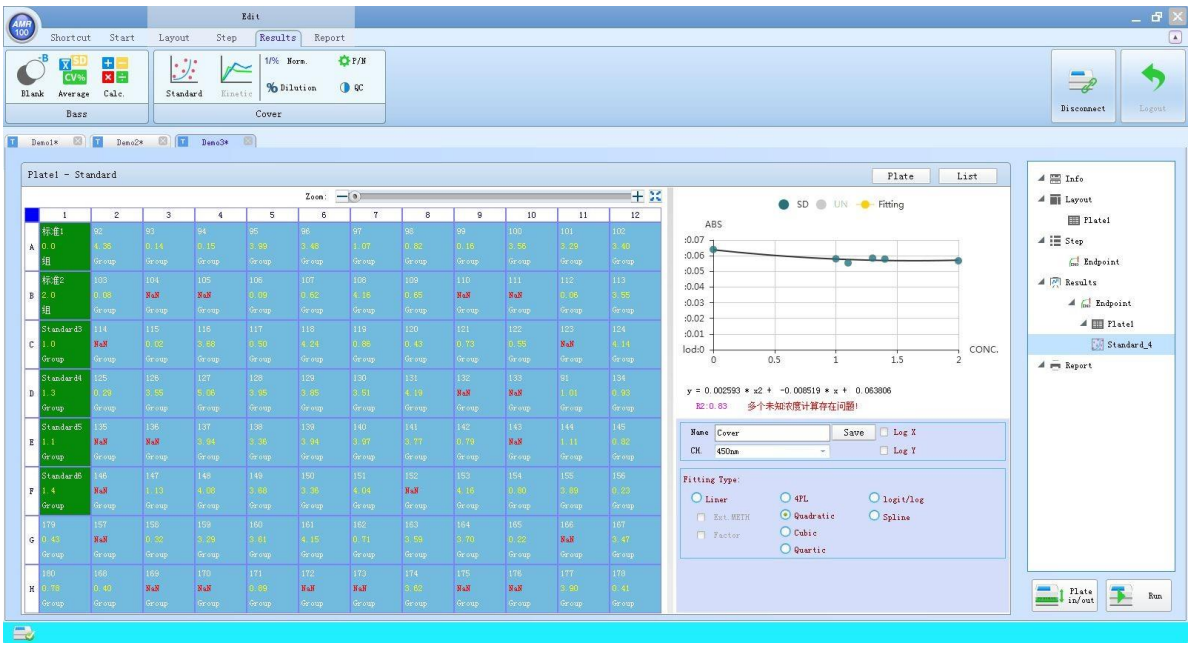


Fig 34

You can switch the fitting type by clicking the radio button as Fig 35 below.

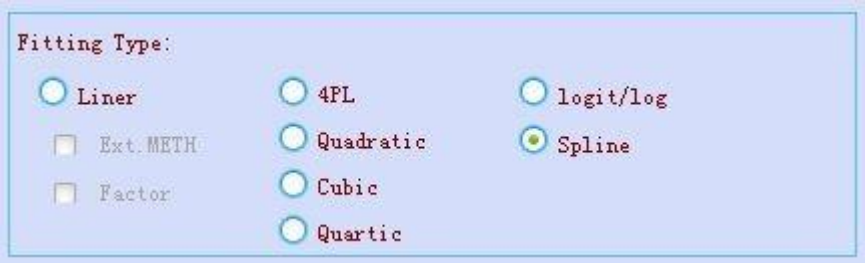



Fig 35

Fitting type and functions as below chart:

| Fitting type | Function |
|---|---|
| Liner | For liner fitting |
| 4PL | 4PL fitting |
| Quadratic | For quadratic polynomial fitting |
| Cubic | Cubic polynomial fitting |
| Quartic | Quartic polynomial fitting |
| Logit/log | Logit/log fitting |
| Spline | Cubic polynomial fitting between two points |

## 6.2 Logit/Log

Curve fitting conditions:

1. There are must be one sample concentration set to “0”, and position of the maximum absorbance point must be corresponding to the “0” concentration point.

***Note: “0” concentration must be the maximum absorbance point, or there will be something wrong with the calculation.**

2. There are must be two or more standard samples with different X values (except 0 concentration point).

3. The curve is linear fitting of logit/log, x-axis stands for linear fitting while y-axis absorbance.

Formula: $\ln \frac{p}{1-p} = k\log 10(x) + b$ (p=y/$y_0$, $y_0$ stands for absorbance value of standard sample at 0 concentration)

4. IC50 is the corresponding concentration value when the absorbance is half of the maximum absorbance of standard sample.

5. For this curve fitting, radio button “Log X” and “Log Y” can not be selected as Fig 36.

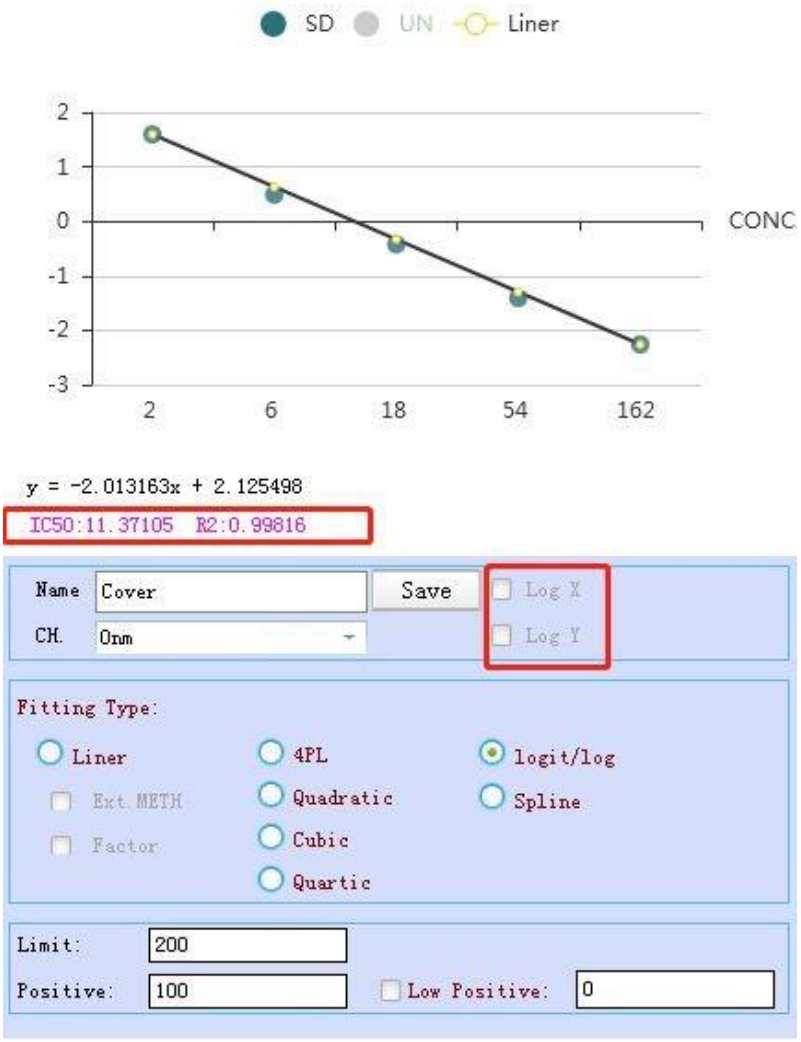



Fig 36

## 6.3 Spline

Standard sample is node which combines with the two adjacent nodes consist the Spline. (Except “0” concentration point)

***Note: “0” concentration must be the maximum absorbance point, or there will be something wrong with the calculation.**

Curve fitting conditions:

1. There are must be one sample concentration set to “0”, and position of the maximum absorbance point must be corresponding to the “0” concentration point.

2. IC50 is the corresponding concentration value when the absorbance is half of the maximum absorbance of standard sample.

3. In the curving fitting mode, radio button “Log X” and “Log Y” are in gray as below.

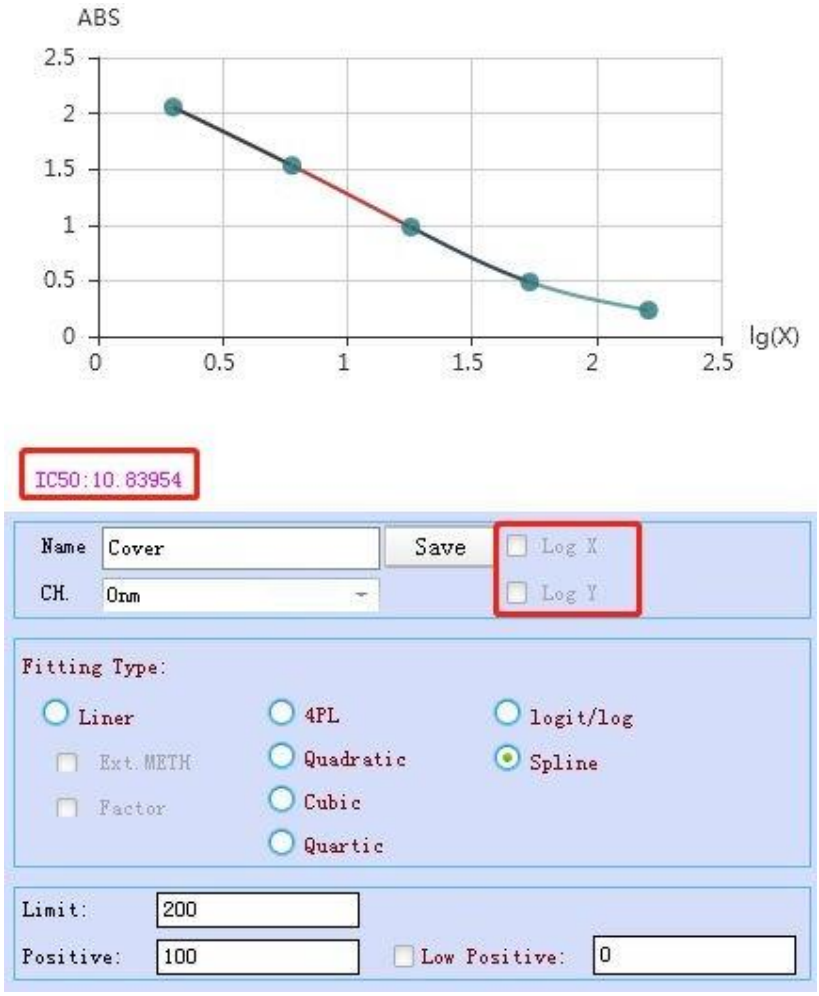



Fig 37

## 6.4 Qualitative Analysis

Qualitative analysis is mainly used to verify positive, negative and low positive, only logit/log and Spline fitting type can be used.

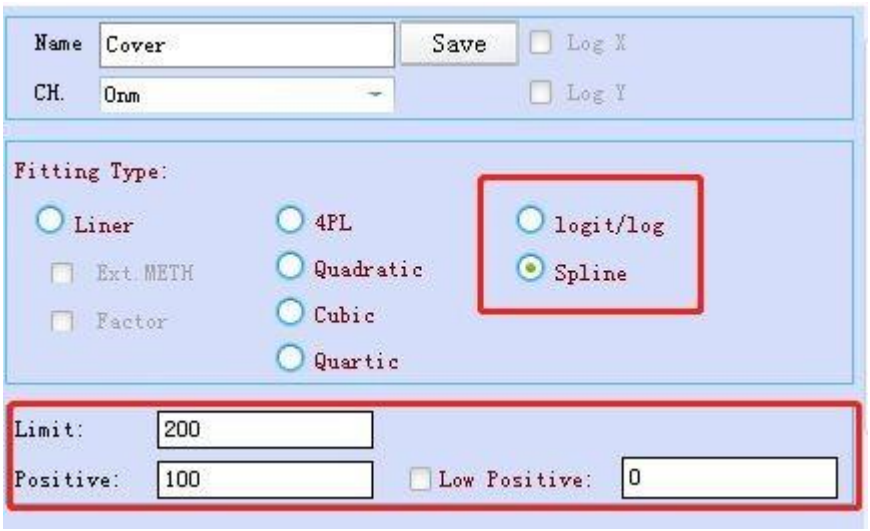



Fig 38

Qualitative analysis functions as below. Low positive function is open when the checkbox was choosen, otherwise, it will be closed.

| Name | Function |
|---|---|
| Limit | Limit is determined by input value |
| Positive | Positive is also determined by input value |
| Low Positive | Also determined by input value |

Click "List" button, please see result interface Fig 39. When sample concentration higher than the positive input value, qualitative result will be positive; when sample concentration lower than the positive input value and higher than low positive input value; qualitative result will be low positive(the checkbox of low positive should be chosen); or it will be negative if in other states.

| Plate | Well | Group | Type | Name | Concentration | Dilution | N/P | |
|---|---|---|---|---|---|---|---|---|
| Plate1 | B9 | | Clear | | 0 | 1.00 | | |
| Plate1 | B10 | | Clear | | 0 | 1.00 | | |
| Plate1 | B11 | | Clear | | 0 | 1.00 | | |
| Plate1 | B12 | | Clear | | 0 | 1.00 | | |
| Plate1 | C1 | Group | Standard | Standard3 | 6.00000 | 1.00 | | |
| Plate1 | C2 | Group | Unknown | 5 | > 6.000000 | 1.00 | Positive | →Positive |
| Plate1 | C3 | Group | Unknown | 13 | 4.86371 | 1.00 | | →Negative |
| Plate1 | C4 | | Clear | | 0 | 1.00 | | |
| Plate1 | C5 | | Clear | | 0 | 1.00 | | |
| Plate1 | C6 | | Clear | | 0 | 1.00 | | |
| Plate1 | C7 | | Clear | | 0 | 1.00 | | |
| Plate1 | C8 | | Clear | | 0 | 1.00 | | |
| Plate1 | C9 | | Clear | | 0 | 1.00 | | |
| Plate1 | C10 | | Clear | | 0 | 1.00 | | |
| Plate1 | C11 | | Clear | | 0 | 1.00 | | |
| Plate1 | C12 | | Clear | | 0 | 1.00 | | |
| Plate1 | D1 | Group | Standard | Standard4 | 18.00000 | 1.00 | | |
| Plate1 | D2 | Group | Unknown | 6 | 5.22532 | 1.00 | Low Positive | →Low Postive |
| Plate1 | D3 | Group | Unknown | 14 | 5.78200 | 1.00 | Positive | →Positive |
| Plate1 | D4 | | Clear | | 0 | 1.00 | | |
| Plate1 | D5 | | Clear | | 0 | 1.00 | | |
| Plate1 | D6 | | Clear | | 0 | 1.00 | | |

Fig 39

# Section 7 Report

## 7.1 Report exporting

Click “Excel” in Report interface, default path is “EXCEL_save” under installation directory, also you can change the path as you like as Fig 40.

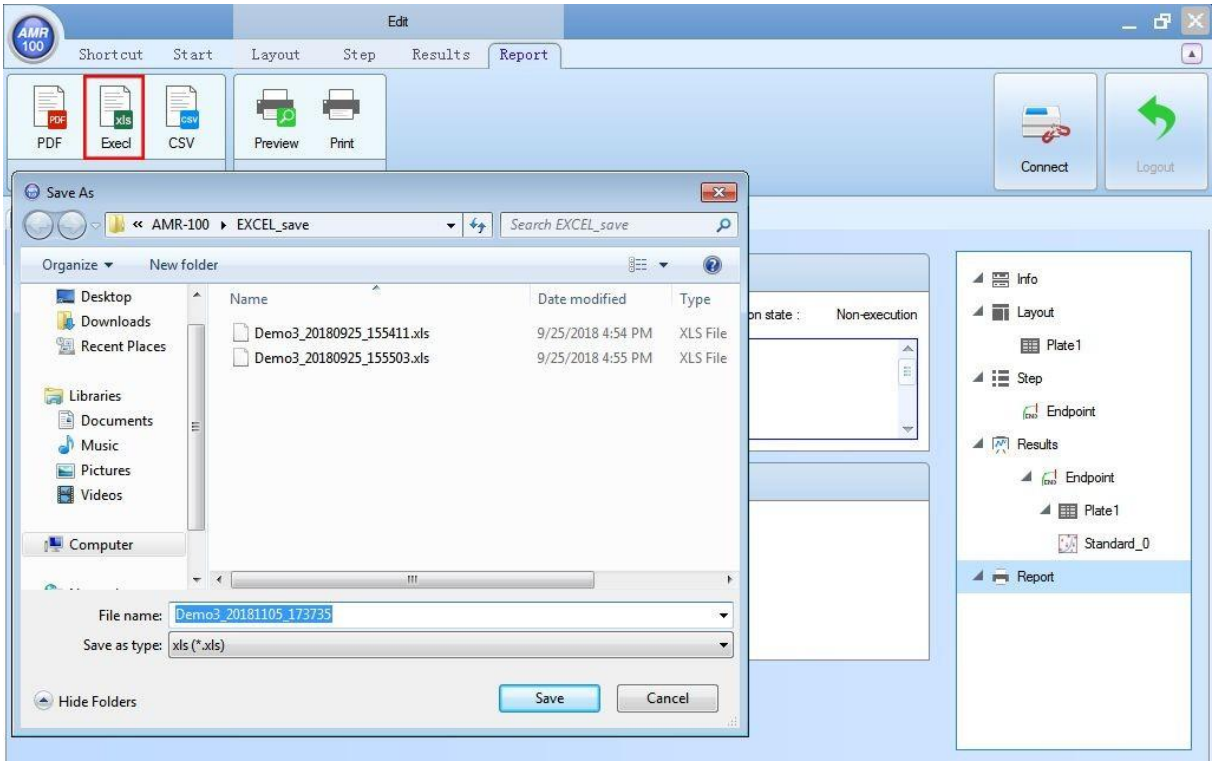



Fig 40