DREAM

USER MANUAL

E-SPECTRO 2

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1. Introduction

1.1. Manufacturer Information

Manufacturer	**SHIN JIN MEDICS INC.**

Manufacturer Address

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Contact Info

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1.2   Manual Preparation Date and Version

Date   2016-03-31
Manual Version   1.0

1.3   INTENDED USE

E-SPECTRO is used in Enzyme Immunization Diagnosis (EIA) to determine the presence or absence of certain disease in patient's specimen by measuring the qualitative/quantitative/semi-quantitative result of the Microplate OD.

2.   Product Description

2.1 Product Name

E-SPECTRO2   (Brand Name: DREAM)

2.2 Product Description

This product is used in Enzyme Immunization Diagnosis (EIA) in measuring the absorbance of the EIA microplate thus; evaluates antigen-antibody reaction of a specimen.

Qualitative, Quantitative and Semi-qualitative assays are provided, in quantitative assay Standard Curve Fitting is analyzed by utilizing a Graph Method such as Point to Point, Linear Regression, Cubic Spline, Smoothing Spline, Four Parameter Logistic, and Five Parameter Logistic.
Total of 7 Band-pass Filter can be installed and with each individual filters, the OD value can be read up to 3.5.

Windows is used as an O.S (Operating System) thus; makes easy to connect with printer, mouse, keyboard and any other external devices and also, the wireless LAN supports an easy network interface with hospital devices.

2.3 Feature

| No.	Item	Description
Hardware	Filter	405nm, 450nm, 620nm (Can be installed up to 7)
	Light Source	20W Halogen Lamp
	OD Range	0~3.5 (When wavelength 3 used, 9.0)
	Reading Speed	10 Seconds per Plate
	ADC	12 Bit(0~4096)
	Supply Power	110~230 VAC, 50/60 Hz
	Power consumption	250 Watt
	Dimension	276(W) x 432(D) x 190(H) (mm)
	Weight	10 Kg
Software	USB Port	External 3 ports
	Assay Type	1) Quantitative Test 2) Qualitative Test 3) Semi-Quantitative Test
	Standard Curve	1) Point to Point 2) Linear Regression 3) Cubic Spline 4) Smoothing Spline 5) Four Parameter Logistic 6) Five Parameter Logistic
	O.S.	Windows 10
	Protocol QC	Included in Manager software

2.4   External Design

2.4.1 Front View

NO.	Name	Description
1	LCD Monitor	Touch available by Table PC. Internally installed wireless LAN and Bluetooth function.
2	EJECT Button	Used to eject in and out the MICROPLATE TRAY. A LED functions once device is turned on.
3	MICROPLATE TRAY	When EJECT BUTTON is pressed, MICROPLATE TRAY is ejected and if pressed again, is inserted.

2.4.2 Side View
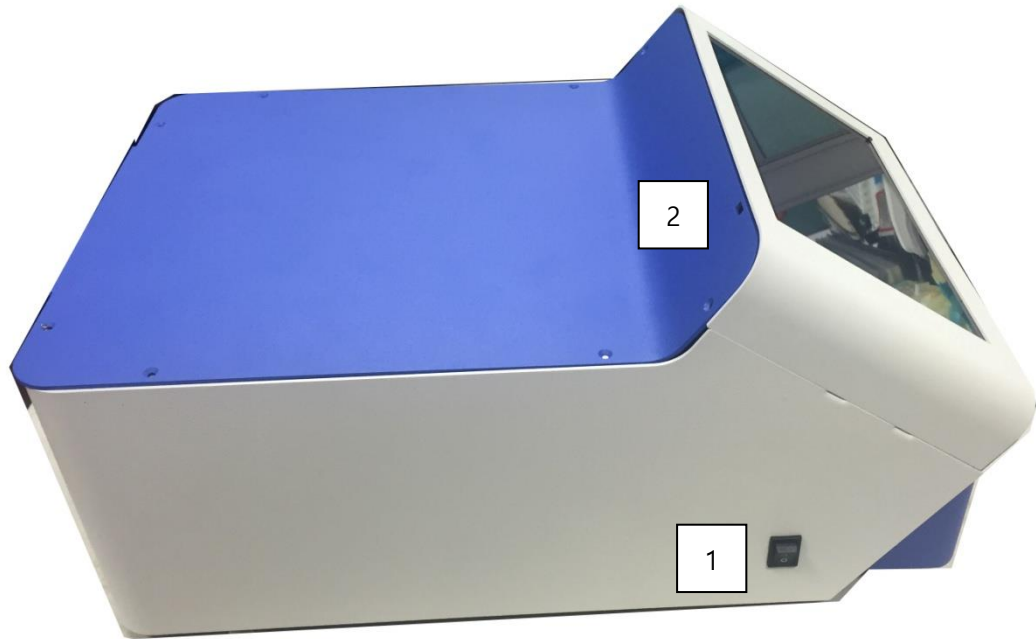
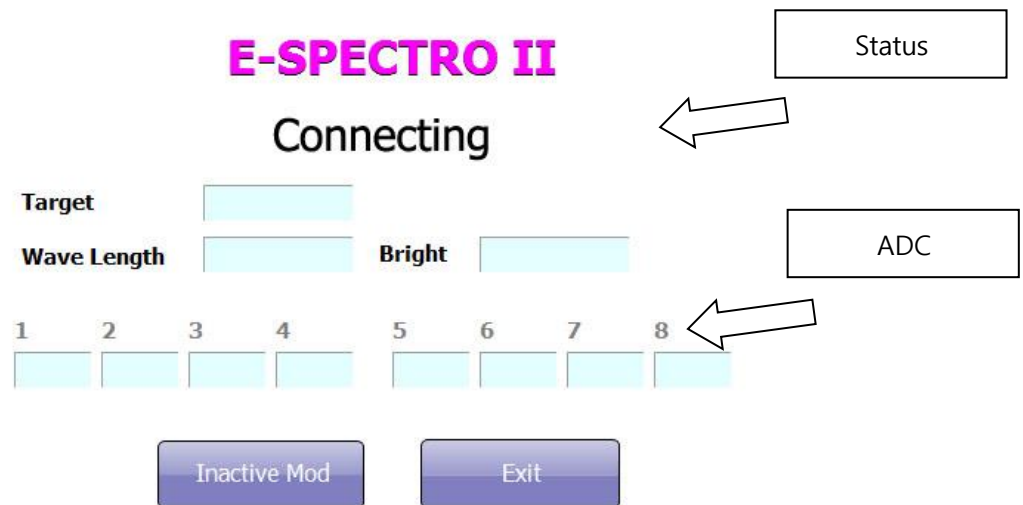| NO.	Name	Description
1	Main Power	Device main power
2	PC Power	Power of PC When PC OFF, press the button about 20 seconds to supply the power. In SLEEP Mode, press the PC power about 1 second then monitor screen appears

2.4.3 Back View

NO.	Name	Description
1	USB SOCKET	USB socket for external device connection
2	Power Connector	Power supply Jack

2.4.4 Component List

NO.	Quantity	Description
1	1	E-SPECTRO2 main body
2	1	Power adapter
3	1	User Manual
4	1	Q.C. Report

3. Device and Program Operation

3.1 Initializing

E-SPECTRO II

Connecting

Status

Target

Wave Length   Bright   ADC

1   2   3   4   5   6   7   8

Inactive Mod   Exit

Step1.

When main power switch is turned on the device automatically operates about 10 seconds for position correction.

Step2.

After the auto-operation of the device run the E-SPECTRO MANAGER to test the next 3 steps:

1) **Communication Line Connection Test**

Connect the device once "Connecting" is displayed on the screen.

If an error message of "Connection Fail" appears, run the program in an Inactive mode then check if the Device Connection Port is correctly set in Configuration.

2) **Device Positioning Test**

Operate the initialization when "Initializing Position" is displayed on the screen.

If an error message of "Filter motor or sensor error" or "Plate motor or sensor error" appears, request for a Service (Mechanical problem in inner part of device).

3) **Background and Empty Well Brightness Accuracy Test**

Inspect the validity by measuring the Background and Empty Well Brightness of each filters.

Problem occurring during initialization, refer to 4.Trouble Shooting.

Step3.

If the auto-operation test is complete, Display the Main View of the program.

3.2 Main View

1) **Protocol**

    Used to create, delete, edit or read the protocol of each assay.

2) **Result**

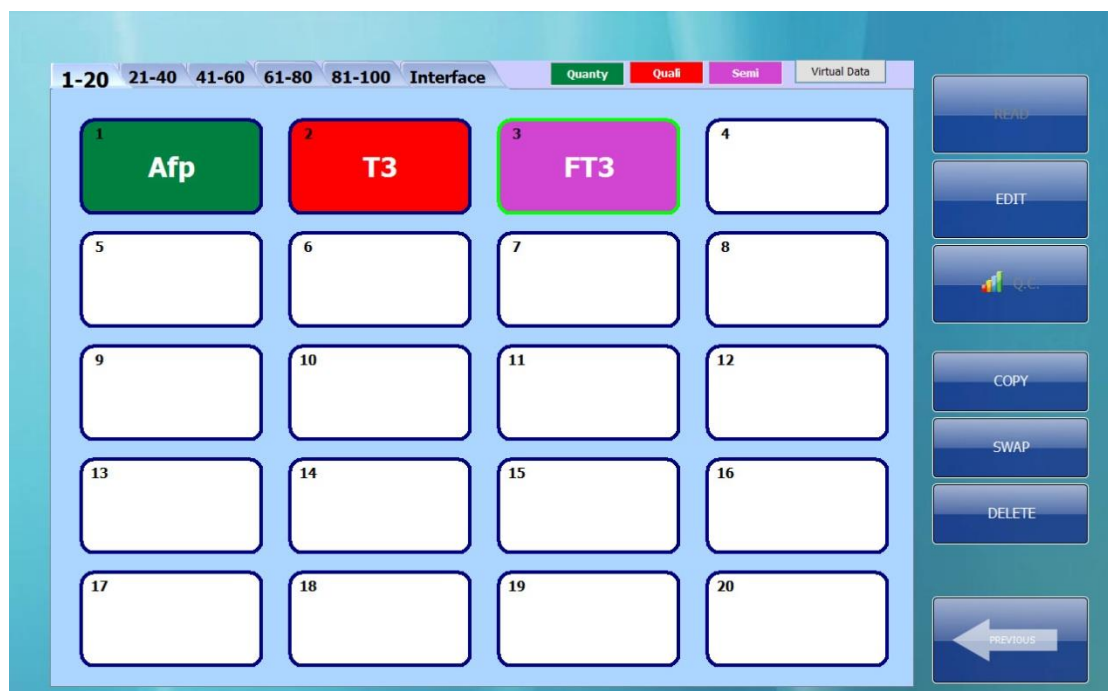   Used to check the result of assay performed.

3) **Configuration**

    It sets the Filter Information, Device Initial Position and its Network Interface.
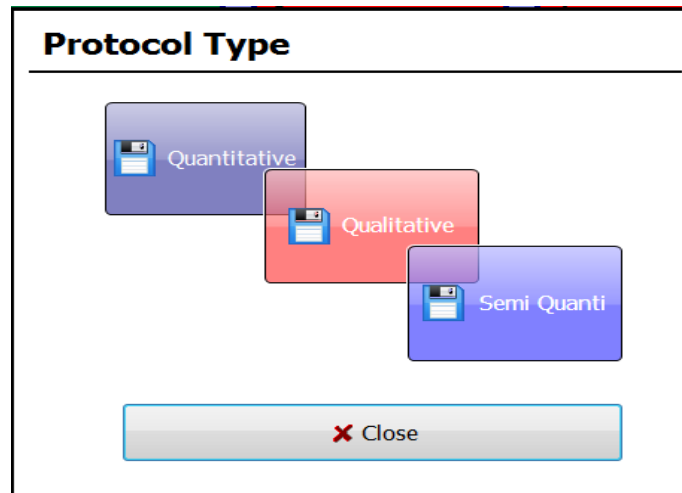
3.3 Protocol

3.3.1 Protocol Main View

Total of 100 Protocols can be saved and the protocol which performs the Quantitative, Qualitative and Semi-quantitative assays can be created and read.

Item	Description
Protocol Button	Item button of the protocol.
Read	Measures the Microplate with selected Protocol.
Edit	Edits the selected Protocol. Even after the protocol modification, the result of assay will not be affected.
Q.C.	Check the EE20, 50 and 80 of the result and the Q.C. result of the Control with the selected Protocol.
Copy	Copies the selected Protocol.
Swap	Changes the position of the selected Protocol with another Protocol.
Delete	Deletes the selected Protocol.
Virtual Data	Used to create a virtual data.

3.3.2 Create and Edit Protocol

Click the empty Protocol Button > Edit to create new protocol. Following Dialog Box will appear. User can select the desired type of Protocol.

1) Quantitative Test
2) Qualitative Test
3) Semi Quantitative Test

3.3.3 Quantitative Test

Item	Description
Protocol Name	Test Name
Interface ID	ID used for the Interface, possible up to 2.
Filter	Filters are Main, Reference and Secondary. Set Wavelength from the Configuration is displayed. Set the wavelength upon testing. - Main Wavelength: Main measuring wavelength - Reference Wavelength: Based on Background wavelength. Actual OD calculation = Main - Reference - Secondary Wavelength: Used when the measured OD is 3.5 from the Main wavelength and desires to measure up to 9.0, This method is calculated by multiplying the computed factor value of Main and secondary wavelength OD ratio evaluation.
Curve Type	Select the type of Standard Curve. - Point to Point - Regression - Cubic Spline - Smoothing Spline - Four Parameter Logistic - Five Parameter Logistic

X(Concentration)	Set the Scale of X-axis (Concentration). Note: The selected Scale does not only change the Curve data displayed but also it directly calculates the data by changing to its corresponding scale. For example, The concentration of S1 and S2 is 20 and 100 respectively, when Linear is set, it Fits the graph by using the value to 20 and 100. When Log is set, graph is fitted by using the values of Log (20) and Log (100). Therefore, If the user wants to fit in the Log-Logit graph, it does not display on the graph type rather user can use Regression Fitting after setting the x-axis as Logit and y-axis as Log.
Y(OD)	Set the Scale of Y-axis OD value. Application for Scale is same as X-axis.
Decimal Point	Set the decimal places to be displayed for the calculated concentration If you want to use the decimal like 1.02, set to 2.
Unit	Can select the Unit. It does not participate in calculation but is simply used as Report reference.
Reagent	Select the type of reagent you want to add, set the number of tests and when you press the arrow button reagent will be added. In case you want to change the concentration, edit the item by clicking the concentration of corresponding reagent from the Conc/Range.
Sample	Set the number of sample test.
Normal Range	Enter the normal concentration value of the sample. In case the sample results show above the set normal values, it displays an 'R' in the ERR items on result window.
Left Arrow Button	Returns to previous screen without saving.
Save	Saves the protocol and returns to previous screen.

3.3.4 Qualitative Test

Item	Description
Protocol Name	Test Name
Interface ID	ID used for the Interface, possible up to 2.
Filter	Filters are Main, Reference and Secondary. Set Wavelength from the Configuration is displayed. Set the wavelength upon testing. - Main Wavelength: Main measuring wavelength - Reference Wavelength: Based on Background wavelength. Actual OD calculation = Main - Reference - Secondary: Used when the measured OD is 3.5 from the Main wavelength and desires to measure up to 9.0. - This method is calculated by multiplying the computed factor value of Main and secondary wavelength OD ratio evaluation.
Formula	The part where you input the formula to be applied in qualitative test. For example, the standard for determining a positive value is greater than the Negative Control X 2 + Positive Control, enter as >=N*2+P. Check the validation of the formula by clicking on Validation Check after entering the formula.

Reagent	Select the type of reagent you want to add, set the number of tests and when you press the arrow button reagent will be added.
Sample	Set the number of sample test.
Gray Zone	Select the zone of evaluation for negative/positive results which are not sure. Each OD value shall be based on the Index which is the Cutoff value. For example, if you want to set the Gray Zone as +/- 10% of the Cutoff, set to 0.9~1.1. Once set and measured, the result will be divided into Positive, Negative, and Gray Zone.
Left Arrow Button	Returns to previous screen without saving.
Save	Saves the protocol and returns to previous screen.

3.3.5 Semi-Quantitative Test

Item	Description
Protocol Name	Test Name
Interface ID	ID used for the Interface, possible up to 2.
Filter	Filters are Main, Reference and Secondary. Set Wavelength from the Configuration is displayed. Set the wavelength upon testing. - Main Wavelength: Main measuring wavelength - Reference Wavelength: Based on Background wavelength. Actual OD calculation = Main - Reference - Secondary: Used when the measured OD is 3.5 from the Main wavelength and desires to measure up to 9.0. - This method is calculated by multiplying the computed factor value of Main and secondary wavelength OD ratio evaluation.
Formula	The part where you input the formula to be applied in qualitative test. For example, the standard for determining a positive value is greater than the Negative Control X 2 + Positive Control, enter as >=N*2+P. Check the validation of the formula by clicking on Validation Check after entering the formula.

Decimal Point	Set the decimal places to be displayed for the calculated concentration If you want to use the decimal like 1.02, set to 2.
Unit	Can select the Unit. It does not participate in calculation but is simply used as Report reference.
Reagent	Select the type of reagent you want to add, set the number of tests and when you press the arrow button reagent will be added.
Sample	Set the number of sample test.
Gray Zone	Select the zone of evaluation for negative/positive results which are not sure. Each OD value shall be based on the Index which is the Cutoff value. For example, if you want to set the Gray Zone as +/- 10% of the Cutoff, set to 0.9~1.1. Once set and measured, the result will be divided into Positive, Negative, and Gray Zone.
Left Arrow Button	Returns to previous screen without saving.
Save	Saves the protocol and returns to previous screen.

3.4 Reading

Step1. Select the protocol you want to Read and press Read button.
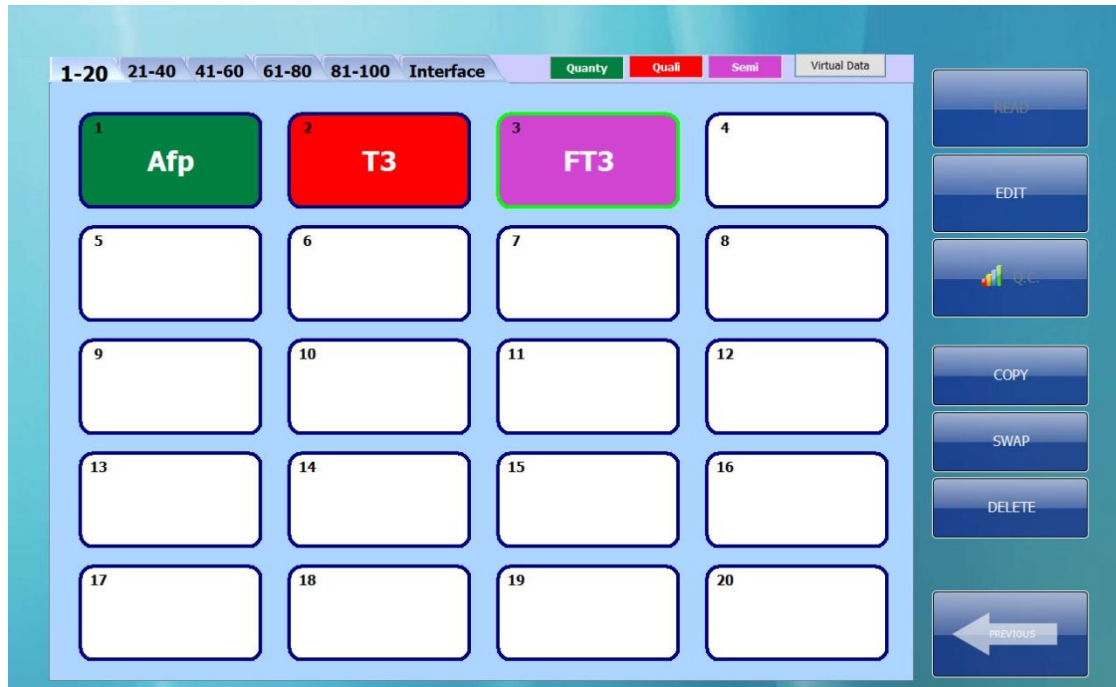
Step2. Enter the number of Well of the Reading. More than 1 Microplate (96 Wells) is possible for reading.

Insert well count

Well Count

96

Last well position

1.H12

✓ OK   ✗ Cancel

Step3. The wavelength on reading will be displayed, and the result after is displayed as shown below.
OD value can be edited on the result page by pressing the 'Next.'
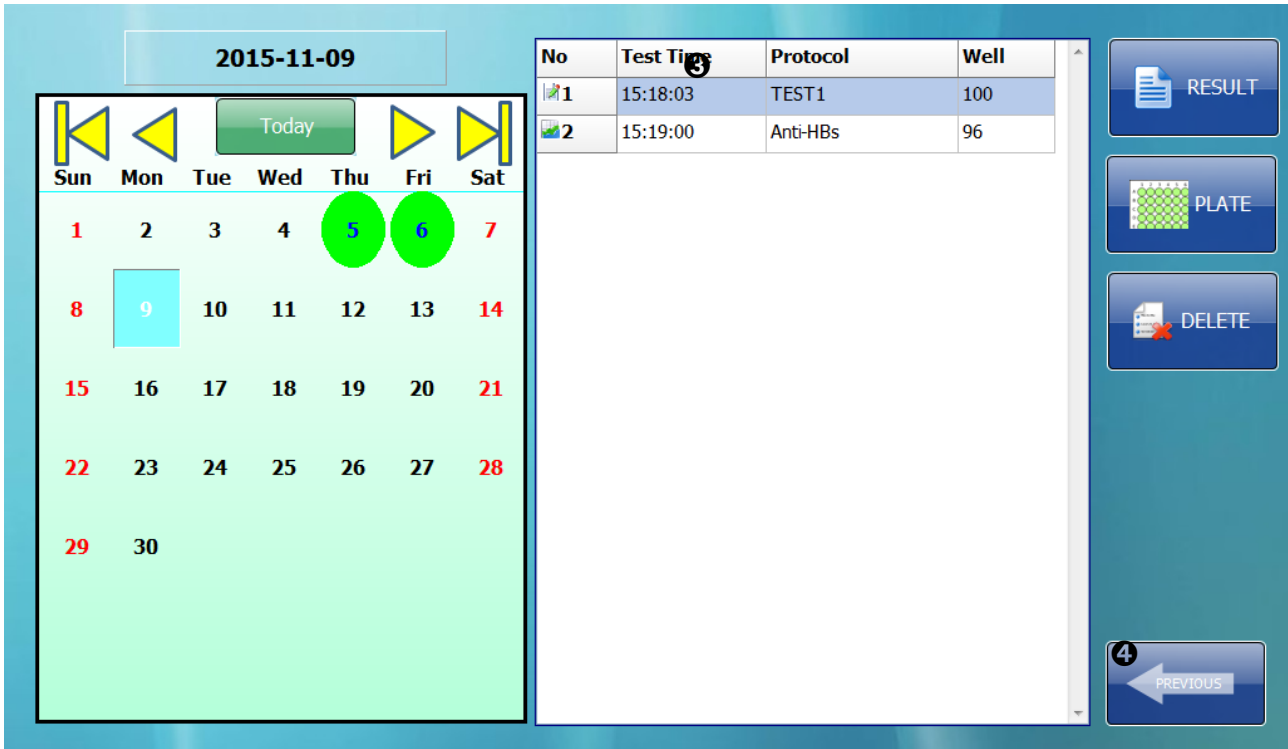
No.	Item	Description
1	Plate Number	If the Well is more than 96, select the number of Microplate you want to display.
2	Display Item	Select between OD/ADC.
3	OD Type	Once you selected the OD, You can check the OD value by selecting its Calculated OD/Main Wavelength/Reference Wavelength/Secondary Wavelength. For Calculated OD: In case only Main Wavelength is selected, the result is the same as Main Wavelength. If Main and Reference Wavelength is selected, the result is calculated as Reference Wavelength. If all Main, Reference and Secondary Wavelength is selected, the result is calculated as Main-Reference wavelength for OD below 2.0 and proportional secondary wavelength for OD above 2.0.

3.5   Result Calculation

3.5.1 Main Screen for Result List

Green circle is displayed on the dates of test performed (Calendar on left).

When corresponding date is clicked, list of tests performed on that day appears and the latest test is shown on the top of the list.

Test list shows the Name and Time of Test, and Number of measured Well.

Select and click Result to see the test results.

To check the OD value in a table form, press the Plate button.

If you want to delete the test result, press Delete button.

3.5.2 Quantitative Test Results

Step1. Reagent Measurement Result Modification and Standard Curve Fitting
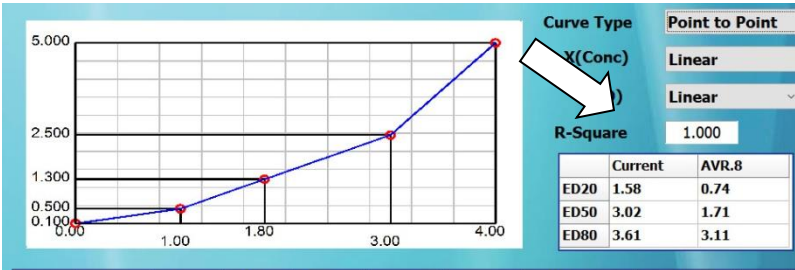
Item	Description
Protocol Name	Test Name
Test Time	Time of test performed
Well Count	Number of Well measured
Unit	Concentration unit
Filter	Wavelength (Main, Reference, and Secondary) used in measurement
Interface ID	Protocol ID used in transferring results to network
Standard Curve Display	If Fitting success, graph will be displayed and if not, "Regression Fail" error will be displayed. If the Standard concentration continuously does not increase or decrease, it will absolutely be 'Regression Fail', in case of specific fitting method, the graph may or may not be drawn depending on its characteristics of the data.

Curve Type	Can select the type of Standard Curve. Curve Type is same as the items shown in the Protocol Edit.
X(Concentration)	Select the data Scale of X-axis. Can assign the Linear and Log.
Y(OD)	Select the data Scale of Y-axis. Can assign the Linear, Log, and Logic. When Logit is used, 1 Standard cannot be calculated because the largest OD value from the data must be used as the denominator. In case of Logic, the linearity of the graph of inverse proportional graph (competitive immunoassay) is good therefore if LOG-LOG is frequently used in proportional graph, LOG-LOGIT is mainly used in inverse proportional graph.
ED20,ED50,ED80 (EC20,ED0,EC80)	Effective Concentration standing for Median Effective dose refers to the Maximum 20%, 50%, and 80% value from the result. This is displayed based on the concentration calculated by Max 20%, 50%, and 70% OD value in the Standard and on the right side, it represents the average of latest 100 tests as a reference. The validity of ED20, ED50, and ED80's Selected tests can be evaluated by comparing with previous data.
R-Square	This is based on measuring the difference between the graph and actual data (Standard) and does not always necessarily pass the Standard points for some Types of graph, in this case, the difference between calculated concentration of graph and the actual set concentration of Standard is evaluated. If the result is 1, means it passes all the Points of the graph and the closer result to 0, the difference of calculated graph and point can be seen. (For reference, Point to Point and Cubic Spline must pass the Standard Point in order for the result to be displayed as 1.) (Point to Point)

(Smoothing Spline)

Name	OD1	OD2	OD3	CV(%)	Mean OD	Conc.	Control Range	Well Pos.	Err
S1	0.100			0.0%	0.100	0.00		1.A1	
S2	0.500			0.0%	0.500	1.00		1.B1	
S3	1.300			0.0%	1.300	1.80		1.C1	
S4	2.500			0.0%	2.500	3.00		1.D1	
S5	5.000			0.0%	5.000	4.00		1.E1	
C1	3.500			0.0%	3.500	3.56		1.F1	
C2	3.500			0.0%	3.500	3.56		1.G1	
C3	3.500			0.0%	3.500	3.56		1.H1	

Reagent

Shows the result of Reagent, and as shown above the Type of Reagent, Measured OD, CV for greater than Duplication, Mean OD, Concentration, Control Range, Well Position (Plate No.), and ERR is displayed from the left.
User can edit by clicking the OD1 value, and is immediately reflected to graph and calculation.

Next Button

Activated when Standard Curve Fitting is accepted,
The data can be checked by pressing the Next Button.

Change Protocol Button

Used to change the protocol of the test, and if modified, the items will reflect only in the results and does not reflect on the original protocol setting.
Modification method is the same as protocol edit in 4.3.2.

Q.C

Provides the statistics of ED,20,50,80 and Control.

Step2. Sample Result

No	Name	Barcode	OD1	OD2	OD3	CV(%)	Mean	Conc	Well Pos	Err
SMP1			0.214	0.218		0.6%	0.216	0.34	1.A2~1.B2	
SMP2			0.601	0.579		1.2%	0.590	0.96	1.C2~1.D2	R
SMP3			3.500	3.500		0.0%	3.500	3.56	1.E2~1.F2	R
SMP4			3.500	3.500		0.0%	3.500	3.56	1.G2~1.H2	R
SMP5			3.500	3.500		0.0%	3.500	3.56	1.A3~1.B3	R
SMP6			3.500	3.500		0.0%	3.500	3.56	1.C3~1.D3	R
SMP7			3.500	3.500		0.0%	3.500	3.56	1.E3~1.F3	R
SMP8			3.500	3.500		0.0%	3.500	3.56	1.G3~1.H3	R
SMP9			3.500	3.500		0.0%	3.500	3.56	1.A4~1.B4	R
SMP10			3.500	3.500		0.0%	3.500	3.56	1.C4~1.D4	R
SMP11			3.500	3.500		0.0%	3.500	3.56	1.E4~1.F4	R
SMP12			3.318	3.500		1.8%	3.409	3.52	1.G4~1.H4	R
SMP13			3.500	3.500		0.0%	3.500	3.56	1.A5~1.B5	R
SMP14			3.500	3.500		0.0%	3.500	3.56	1.C5~1.D5	R
SMP15			3.500	3.500		0.0%	3.500	3.56	1.E5~1.F5	R
SMP16			3.500	3.500		0.0%	3.500	3.56	1.G5~1.H5	R
SMP17			0.550	0.540		0.6%	0.545	0.89	1.A6~1.B6	R
SMP18			0.535	0.535		0.0%	0.535	0.88	1.C6~1.D6	R
SMP19			0.535	0.537		0.1%	0.536	0.88	1.E6~1.F6	R
SMP20			0.533	0.537		0.2%	0.535	0.88	1.G6~1.H6	R
SMP21			3.500	3.500		0.0%	3.500	3.56	1.A7~1.B7	R
SMP22			3.500	3.500		0.0%	3.500	3.56	1.C7~1.D7	R
SMP23			3.500	3.500		0.0%	3.500	3.56	1.E7~1.F7	R

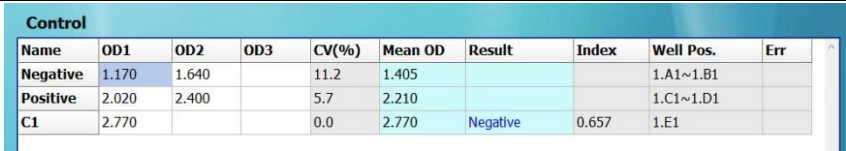| Item	Description
Protocol Name	Test Name
Name	Patient Name (Information received from Network Interface)
Barcode	Patient Registration No. (Information received from Network Interface)
OD1,OD2,OD3	Result
CV (%)	Greater than Duplication: CV of OD value
Mean	Mean of OD
Well Position	Microplate Well Position
ERR	If above the Normal Range, displayed as 'R'
Save	Saves the protocol and returns to previous screen
Print	If printer is installed, print with the default printer
Network	Sends the result by Network
Left Arrow Button	Returns to previous screen without saving
Normal Range	Normal Range set on the protocol

3.5.3 Qualitative Result

Step1. Reagent Result Edit and Cut-off Calculation
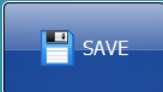
Item	Description
Protocol Name	Test Name
Test Time	Time of test performed
Well Count	Number of Well measured
Formula	Cutoff Formula
Cut off	Processed as Index=1 by Calculated Cut off value
P/N RATIO	Positive/Negative Ratio used for Q.C. The Mean P/N Ratio of Protocol recently performed is shown on the right.
Gray Zone	Displayed here when Gray Zone set in the protocol Value is based on the Index
Reagent	 Shows the result of Reagent, and as shown above the Type of Reagent, Measured OD, CV for greater than Duplication, Mean OD, Concentration, Control Range, Well Position (Plate No.), and ERR is displayed from the left. User can edit by clicking the OD1 value, and is immediately reflected to graph and calculation.

Step2. Sample Result

Item	Description
Protocol Name	Test Name
Name	Patient Name (Information received from Network Interface)
Barcode	Patient Registration No. (Information received from Network Interface)
OD1,OD2,OD3	Result
CV (%)	Greater than Duplication: CV of OD value
Mean	Mean of OD
Result	Positive/Negative/Gray Zone
Well Position	Microplate Well Position
ERR	If above the Normal Range, displayed as 'R'
Save	Saves the protocol and returns to previous screen
Print	If printer is installed, print with the default printer
Network	Sends the result by Network
Left Arrow Button	Returns to previous screen without saving
Normal Range	Normal Range set on the protocol

3.5.4 Semi-quantitative Result

Step1. Reagent Result Edit and Cut-off Calculation

Protocol Name	FT3				

Filter	**W.L.**	
Primary	450	
Secondary	620	
Reference		

No	Interface ID
1	
2	

Test Time: 2016-03-30 19:18:04

Well Count: 20

Formula: = N*X

Unit: i   Decimal Point: 1

Normal Range: ___ ~ ___

Control

Name	OD1	OD2	OD3	CV(%)	Mean OD	Conc.	Control Range	Well Pos.	Err
Negative	1.140			0.0	1.140			1.A1	
Positive	1.520	1.890		7.2	1.705			1.B1~1.C1	
C1	2.270			0.0	2.270	2.6		1.D1	

NEXT

Change Protocol

PREVIOUS

Item	Description
Protocol Name	Test Name
Test Time	Time of test performed
Well Count	Number of Well measured
Formula	Cutoff Formula
Unit	Concentration unit
Decimal Point	Decimal places to be used in the concentration calculation
Normal Range	Normal Range set on the protocol
Reagent	<table><tr><td>Name</td><td>OD1</td><td>OD2</td><td>OD3</td><td>CV(%)</td><td>Mean OD</td><td>Conc.</td><td>Control Range</td><td>Well Pos.</td><td>Err</td></tr><tr><td>Negative</td><td>1.140</td><td></td><td></td><td>0.0</td><td>1.140</td><td></td><td></td><td>1.A1</td><td></td></tr><tr><td>Positive</td><td>1.520</td><td>1.890</td><td></td><td>7.2</td><td>1.705</td><td></td><td></td><td>1.B1~1.C1</td><td></td></tr><tr><td>C1</td><td>2.270</td><td></td><td></td><td>0.0</td><td>2.270</td><td>2.6</td><td></td><td>1.D1</td><td></td></tr></table> Shows the result of Reagent, and as shown above the Type of Reagent, Measured OD, CV for greater than Duplication, Mean OD, Concentration, Control Range, Well Position (Plate No.), and ERR is displayed from the left.

	User can edit by clicking the OD1 value, and is immediately reflected to graph and calculation.

Step2. Sample Result

Item	Description
Protocol Name	Test Name
Name	Patient Name (Information received from Network Interface)
Barcode	Patient Registration No. (Information received from Network Interface)
OD1,OD2,OD3	Result
CV (%)	Greater than Duplication: CV of OD value
Mean	Mean of OD
Well Position	Microplate Well Position
ERR	If above the Normal Range, displayed as 'R'
Save	Saves the protocol and returns to previous screen
Print	If printer is installed, print with the default printer
Network	Sends the result by Network
Left Arrow Button	Returns to previous screen without saving
Normal Range	Normal Range set on the protocol

3.5.5 Display in PLATE Form

If you want to check the Plate Reading result by each wavelengths or simply need the OD value only, by using this feature you can see the Microplate OD value.

Item	Description
Plate Number	Tested Plate Number
Value Type	Can be selected between OD and ADC OD(Optical Density) =log10 (Empty ADC/Target ADC)
OD Type	Calculated OD : Primary Filter, Reference: If filter is set Primary-Reference Value displays If Secondary Filter applied the value applied with K-Factor is displayed Measured Wavelength : OD values for single wavelength is displayed
NEXT	Can check the result
Print	Print the current screen contents
Left Arrow Button	Returns to previous screen without saving

3.6 Protocol Q.C
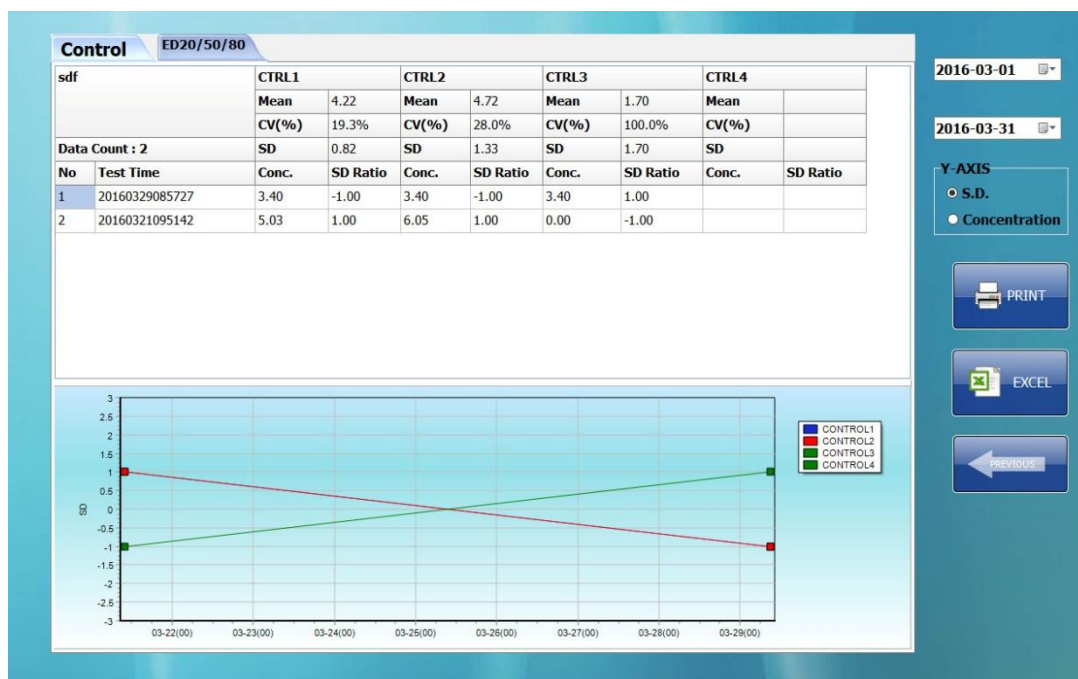
By using the statistic (ED20, ED50, ED80 and Control) function in quantitative assay, user can check the CV, SD, and Mean of the data on selected test date performed thus; allows to evaluate the stability of the reagents indirectly.

SD Ratio is shown in red for the tests above 2SD allowing the users to easily check.

The concentration and SD Ratio per Test Time is displayed and the statistic formula for each item are as follows:

$$SD = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2}$$

$$CV(\%) = SD/m$$

$$SD\ RATIO = (x_i - m)/SD$$

(n: Data Count, x_i : Data Concentration, m : Average of Concentration)

Item	Description
Select Date	Select the date you wish to QC.
Y-Axis	Select the data type to display on Y-axis. Select between OD Ratio and Concentration.
Print Button	QC results can be printed.
Excel	Saves the data file in form of CSV.
Left Arrow Button	Returns to previous screen without saving.

3.7 Configuration

Item	Description
Device Connection Port	Set the Serial Port connecting in between the device and computer. Serial Port can be checked in Control Panel -> Hardware and Sound -> Device Manager of the windows.
Filter	Set the Band-pass Filter. Wavelength is not an actual value measured but can be assigned as the preference of the user, Brightness sets the brightness of the Halogen Lamp when measuring with its filter. We recommend to set the brightness to values more than 2500 in all sensors. However, the position of the set filter is important and when opening the device, the Filter Tray is located in front of the user's location.
Initial Information	The initial data measured per filter during the program execution can be checked. Below 100 background values are recommended and an error occurs if 150 above thus; fail to measure. Sensor value of 2500-4000 is recommended for the brightness of Empty Well and if below 1500, an error will occur thus; fail to measure.
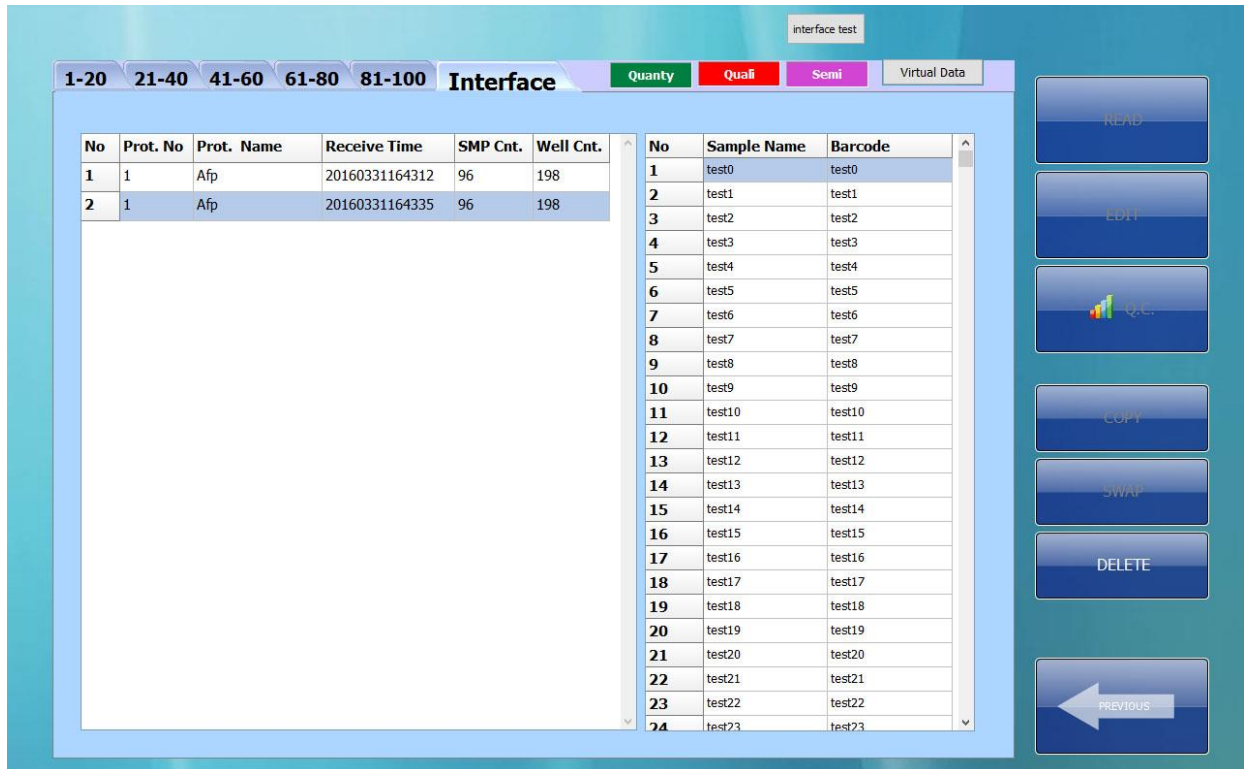
Empty Well Subtraction	Upon Well measurement, it does not only measure the OD value of the actual reagent inside but also the Transparent contained on Well is influenced. If Reference wavelength is generally used, the OD value is subtracted automatically so there would be no problem however, if you are to measure the OD value of materials inside by a single wavelength, must enter. Enter the difference ratio of the ADC measured without inserting a Well and ADC measured with an Empty Well for the entry value. For example, ADC without inserting a Well is 3500 and 3000 for Empty Well, (3500-3000) /3500 =0.1428 => Enter 14%.
Interface	Select the Network File Path in receiving and sending the Worklist and result for Network Interface. For more details, refer to "Network Interface".
X Init Position	Set the initial point of Microplate Tray.
F Init Position	Set the initial point of Bandpass Filter Tray.
Save	Saves the modified result.

3.8 Network Interface

3.8.1 Receiving and Measuring Worklist

If the Network Interface is set in the configuration, the Worklist can be received and Result Data can be transferred by the server.

When receiving a Worklist from the Server, click the Interface Tab of protocol from the initial menu to check the Worklist.

If you are to measure the Worklist, choose the Worklist you desire and click Read button on the Worklist box shown on the left.

And if you want to delete the Worklist, click the Delete button on the lower right of the screen.
To send the result after testing, click Network interface button on the result screen.

3.8.2 Network Protocol

The Result/Worklist uses the same Protocol in data transmission and is composed of Packet Header + (Patient Record x N) (N:Record number).
For example, to send 3 patient data,
Send together with Packet Header (Sample Count=3) + Patient1 Record + Patient2 Record + Patient3 Record.
NULL (0x00) entry is a default for the portion that are not filled inside.

1) Packet Header

[C Language]

```c
typedef struct
{
  char[20] InterfaceId1 ;   // Interface ID1 defined in the protocol.
  char[20] InterfaceId2 ;   // If other ID exists, Enter Interface ID 2 also.
                            // E-SPECTRO Manager searches the protocol which match
                            // with Interface ID1 and 2 and if any of the protocols match
                            // appropriate protocol is selected.
  char[5] SampleCount ;     // Enter the Sample No. in Text Format not Binary Format.
                            // Number entered must match with Patient Record.
                            // (Ex.) "15"
  char [50] rsvd ;          // If not used as dummy field, enter NULL.
} TInterfaceHeader ;
```

[PASCAL]

```pascal
type TInterfaceHeader=packed record
        InterfaceId1:array[0..19] of ansichar ;
        InterfaceId2:array[0..19] of ansichar ;
        SampleCount:array[0..4] of ansichar ;
        rsvd        :array[0..49] of ansichar ;
    end;
```

2) Patient Record

Data must exist as much as the Sample Count set on the Packet Header.

[C Language]

```
typedef struct
{
            char[50] SampleName;        // Patient Name
             char[50] SampleBarcode   ; // Patient Barcode No.
             char[11]    OD ;            // Measured OD. Shows up to 3 decimal places.
            char[15]    Result ;        // Result
                                        // Conc value sent for Quanti & Semi-quantitative
                                        // POSITIVE & NEGATIVE for Qualitative
            char[10] index ;            // Ratio of Cut-off value during Qualitative
            char[50] rsvd ;             // If not used as dummy field, enter NULL.

} TPatientRecord ;
```

[PASCAL]

```
   type TInterfaceRecord=packed record
            SampleName:array[0..49] of ansichar ;
            SampleBarcode:array[0..49] of ansichar ;
            OD      :array[0..10] of AnsiChar ;
            Result:array[0..14] of ansichar ;
            index :array[0..9] of ansichar ;
            rsvd   :array[0..49] of ansichar ;
       end;
```

4. Troubleshooting

4.1 Trouble Shooting

1) Connection Fail

(Indication/Causes) Device connection failed

(Management)

Step1. Check if the Serial Port (that connects with the device) is equipped in the Control Panel of Windows system.

If none, check the connection between the Computer and the Main Board.

You can easily check this by simply connecting of USB port with USB memory or a mouse.

If the connection is not accessed in WINDOWS, request a service maintenance because an error might have occurred with the Device and Main board connection.

Step2. Check whether the Device connection Port is well set in the Configuration.

2) [ERROR] Connection Fail(No Response)

(Indication/Causes) Serial Port is opened however, Device connection failed.

(Management) Same as the management of Connection Fail.

3) [ERROR] Background is too high.

(Indication/Causes) In case the ADC value of a Background is above 150 from total / partial sensor.

(Management)

Step1. Check if the same happens even after the device and program is started over.

If it normally works, the initial detection sensor point of the Plate and Filter Tray might have caused an error. If error frequently repeated, replace the Sensor.

Step2. Open the device and check the position of the Plate and Filter Tray.

During initialization the Halogen Lamp turns on to check the location and a light checks if the Plate Tray matches with the initial position of the entrance and light is projected at the center of first Filter of the Filter Tray.

If the position is not correct, adjust the X and F Initial Position from the Configuration.

4) [ERROR] Bright variation is too high.

(Indication/Causes) In case the ADC value of Sensor (partially) is above the normal range which is from 1500 to 4000.

(Management)

Step1. Same as Step1 of 3)

Step2. Same as Step2 of 3)

Step3. Request a service maintenance due to an error in the optical cable.

5) **[ERROR] Row Max bright.**

    (Indication/Causes) The Maximum Lamp strength is increased up to 255 however, the light measured from the Sensor is below 1500.

    (Management)

      Step1. Same as Step1 of 3)

      Step2. Same as Step2 of 3)

      Step3. Due to dusts on top of the Band-pass Filter, clean the Filter by opening the device.

      Step4. Due to an expiration of a Halogen Lamp Life time, replace the Lamp.

6) **In case Crosstalk exists in the Sensor when measured with Q.C Plate**

    Step1. Same as Step1 of 3)

    Step2. Same as Step2 of 3)

    Step3. Check whether the Filter Cover is secured in place.

7) **In case OD value differs a lot from the same line when measured with Q.C Plate**

    Step1. Check if the Q.C. Plate is clean.

    Step2. Check whether the Filter Cover is secured in place.

5. Safety Precaution

5.1 Transportation Safety

Special precaution is needed during device transportation because the accessories installed inside such as Band Pass Filter and Halogen Lamp are very much fragile.

- Since battery is used in supplying a power to the PC, turn off the power of the PC upon packing.
- Do not carry the device upside down.
- It is recommended to securely pack for protection.
- Be sure to transport without any objects on the top of the device.
- Attach a Fragile Mark on exterior packing box.
- Check if the Plate Tray is empty.

5.2 User Safety

Installation Precaution

- Install the device on a solid desk.
- Solid desk must be stable and do not expose in humid and high temperature areas.
- Install the device with a distance of 20 cm from the wall or surrounding devices.
- Do not expose to sunlight
- External Temperature: 15~28℃ (Maintain the external temperature as low as possible because the accessories installed internally such as Halogen Lamp and Table PC is sensitive to exothermic reaction.)
- External Humidity: 20~80%

Operation Precaution

- Operate the device in an appropriate setting.
- Never put any foreign materials or human body parts inside the device during operated.
- Do not put heavy objects on the top of the product.
- Make sure to maintain a clean surrounding because a spill may occur inside the reader in case water is stained on the outside of a Microplate or device is operated with a plate full of reagents.

6.   Maintenance

6.1   Maintenance

1)   Weekly maintenance
- Check the device using a Q.C. Plate.

2)   Monthly maintenance or A Quarter-year maintenance
- In case of frequent usage (at least once a day), clean monthly. On the other hand, open the device internally and clean the debris falling from the Microplate.
  At this time, be careful not to cut off the internal wiring.
- BACKUP the results in an external memory such as USB.

3)   Annual maintenance

Evaluate the reading accuracy of the equipment by a Certified Authority.