



MRX View

MRX A2000 (Microplate Reader)
Software User Manual

1. Basic screen description
 2. How to use plate mode
 3. How to use the cuvette mode
- * Equipment manual attached

klab.im

Summary

Thank you for purchasing K LAB's MRX Series.

This user's guide explains in detail how to operate it and the precautions for use. Familiarize yourself with the user guide before using the program. Please use it according to the instructions. Also, please keep it for reference when using the program.

Important

Please keep this user guide together with the product. If the program needs to be readjusted or reinstalled, or if the user guide is lost or damaged, please contact K LAB Customer Center.

This guide uses the following conventions:



Note

Additional information was provided to ensure the correct use of the product.



Indicate the software area to be described on that page.

Recommended Specifications

Operating system	Windows® 10	Windows® 10, 11
Processor	Intel® Pentium® D or AMD™ Athlon™ 64 X2	Intel® Core 2 Duo E6600 (2.4 GHz) or AMD™ Athlon™ 64 X2 5000+ (2.6 GHz) or more
Video	NVIDIA® GeForce; 6800 (256 MB) or ATI™ Radeon™ X1600 Pro (256 MB) or more	NVIDIA® GeForce; 8800 GT (512 MB) or ATI™ Radeon™ HD 4850 (512 MB) or more
Memory	2 GB RAM	4 GB RAM
RAID	-	RAID1, RAID 0+1, RAID5
Storage	At least 1 GB	100 GB or more
Resolution	Minimum 1024 x 768 display resolution	1920 x 1080 display resolution or higher

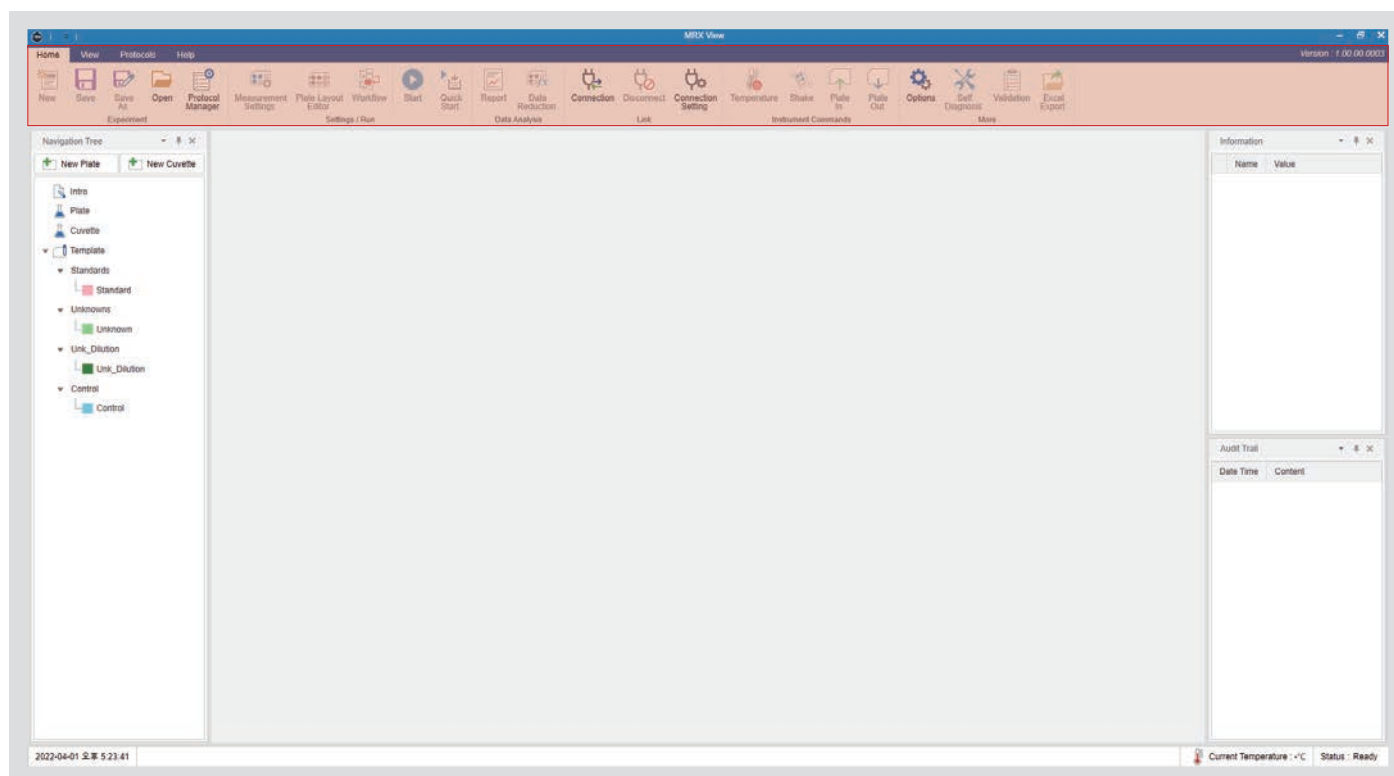
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1. Basic screen description

Describes the basic structure of MRX View.



1.1 Home



Close the opened experiment and create a new one.



Save the experiment.



Save the experiment under a different name.



Recall a saved experiment.



Load a pre-saved protocol or save and load the currently set experiment information.



Set the plate range and measurement information such as the wavelength to be used.



Set the plate layout.



Set the workflow of the experiment.



Execute the set workflow.



Measure the currently selected plate.



Create a report with measured values.



Apply a formula to the measured values.



Connect the equipment.



Disconnect the equipment.



Set the connection information for the equipment.



Turn the temperature on for the equipment.



Turn the temperature off for the equipment.



Shake the plate.



Put the plate into the equipment.



Remove the plate from the equipment.



Set other options for the experiment.



Perform a self-diagnosis of the equipment.



Perform validation for instrument measurements.



Export the measured data to Excel.



Register the micro-volume plate information or auto-align cell positions.

1.2 View



Initialize the software layout.



Save the software layout.



Load the saved software layout.



Open and close the navigation tree pane.



Open and close the measurement information window.



Open and close the audit history window.

1.3 Protocol



Save the current experimental setup information as a protocol.



Save the current experimental setup information as a protocol with a different name.



Display the protocol manager on the screen.



Export the saved protocol to another selected saved folder.



Load a pre-saved external protocol and save it in the designated protocol folder.

1.4 Help



Display the help function for the software.



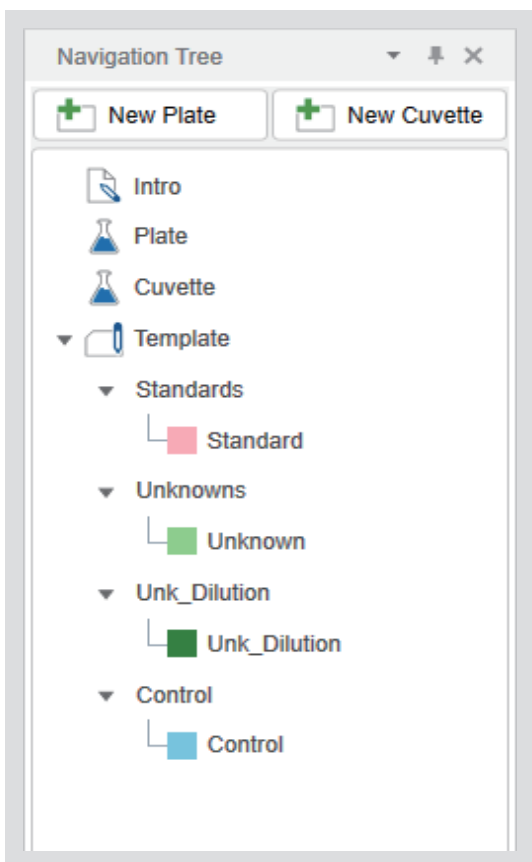
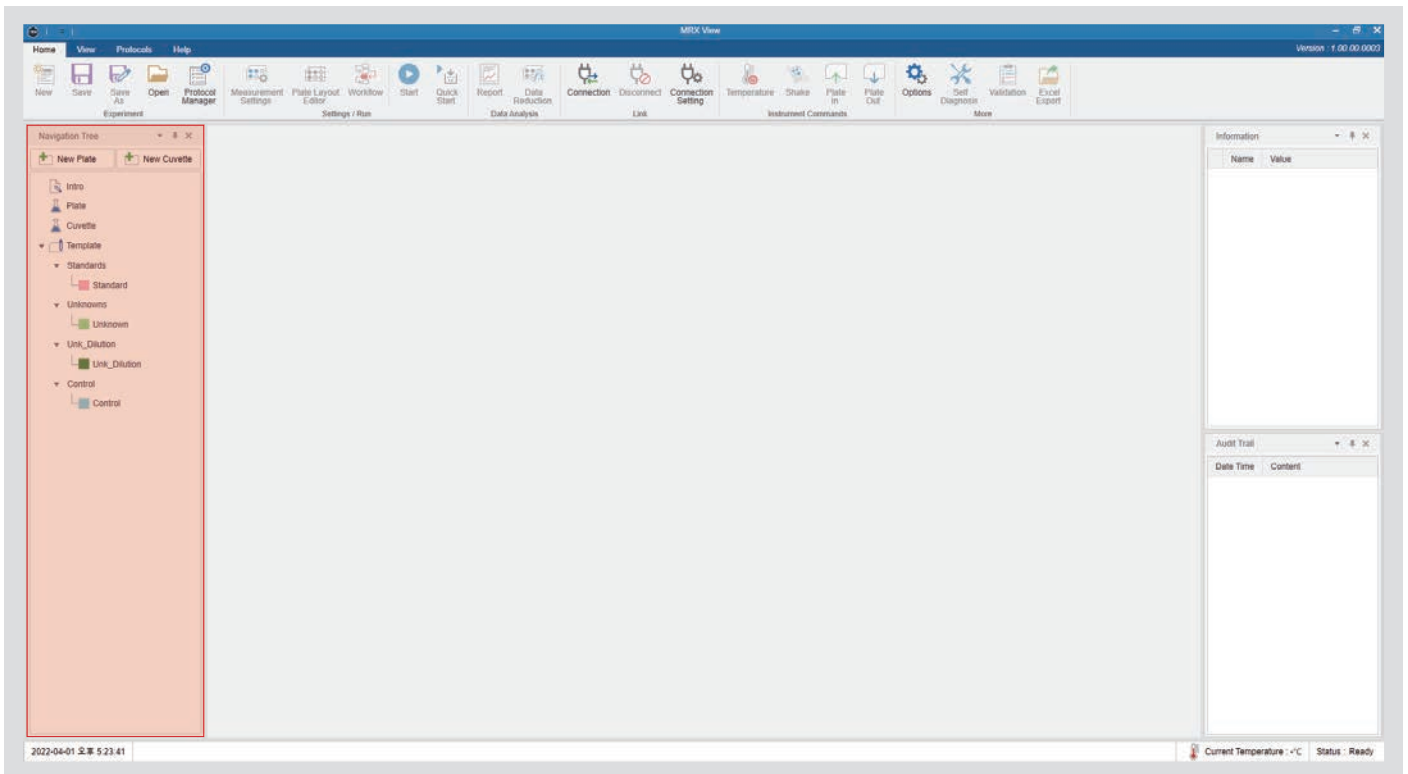
Change the language for the software.



Show software information.



Update the firmware.



1.5 Navigation tree



Create a plate by selecting the measurement mode, plate range, and wavelength to be used.



Show the introduction and description of the experiment.



Plate

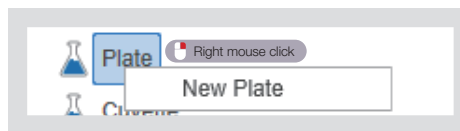
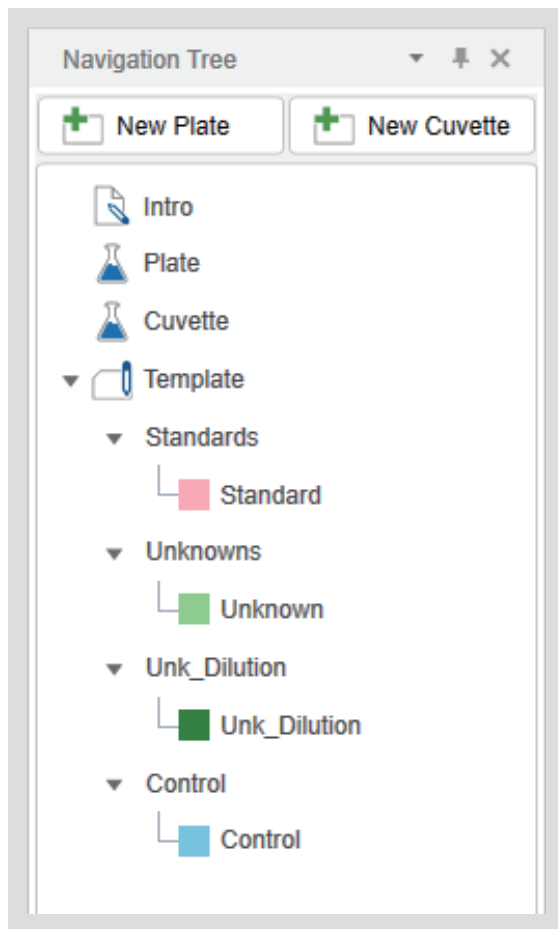


Cuvette

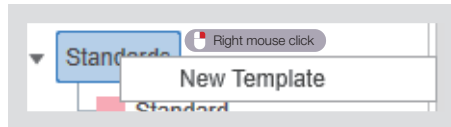


Layout

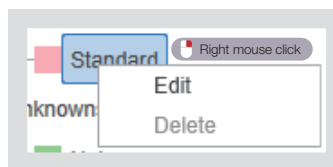
1.5.1 Navigation tree - Plate



New Plate: Create the plate mode by selecting the measurement mode, plate range, and wavelength to be used.

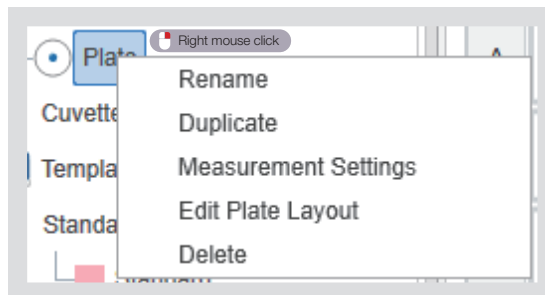


New Template: Create a new layout by choosing a name and color for the layout.



Edit: Change the name and color of the layout.

Delete: Delete the layout.



Name Change: Change the name of the plate.

Copy: Create a new plate by duplicating all setup information except for the plate's measurement data.

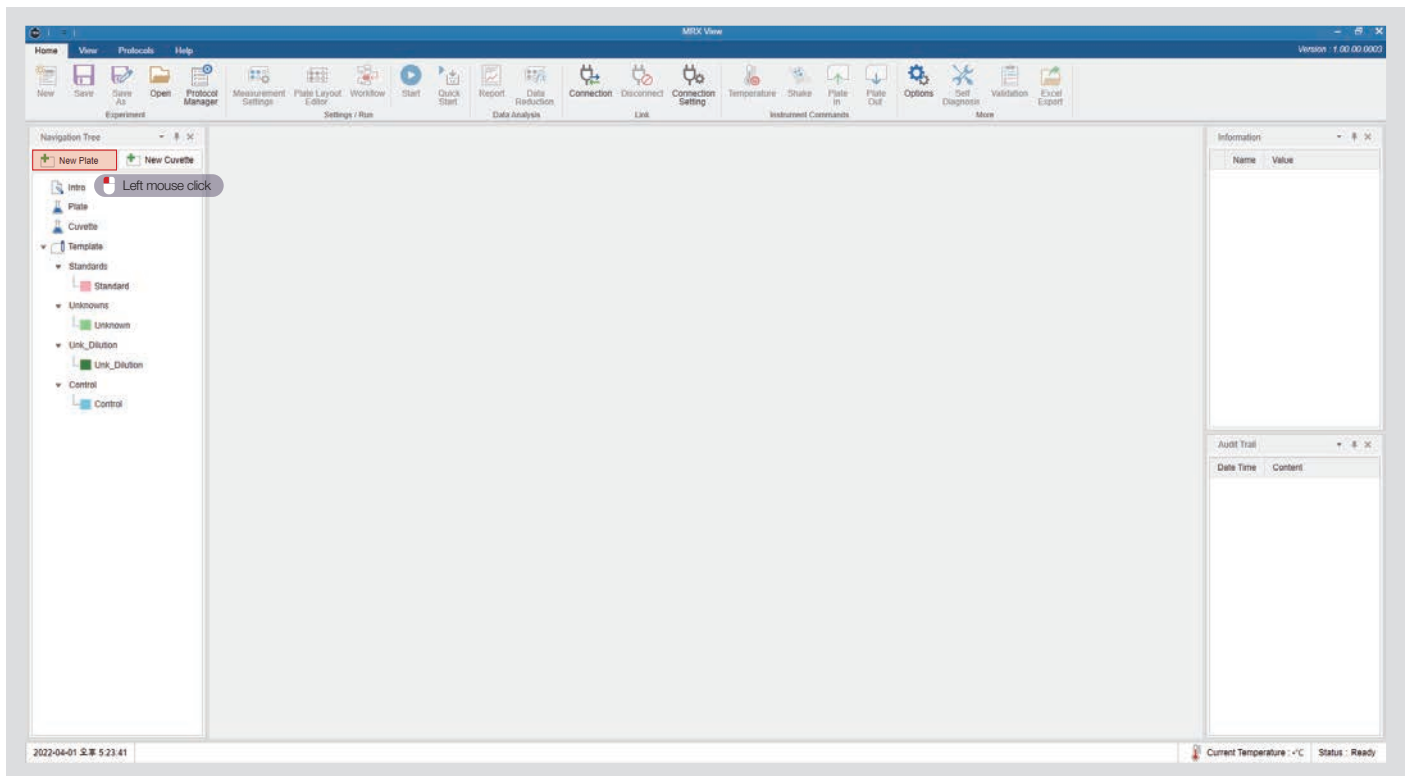
Measurement Settings: Set measurement information such as the range of the plate and the wavelength to be used.

Edit plate layout: Set the plate layout.

Delete: Delete the plate.

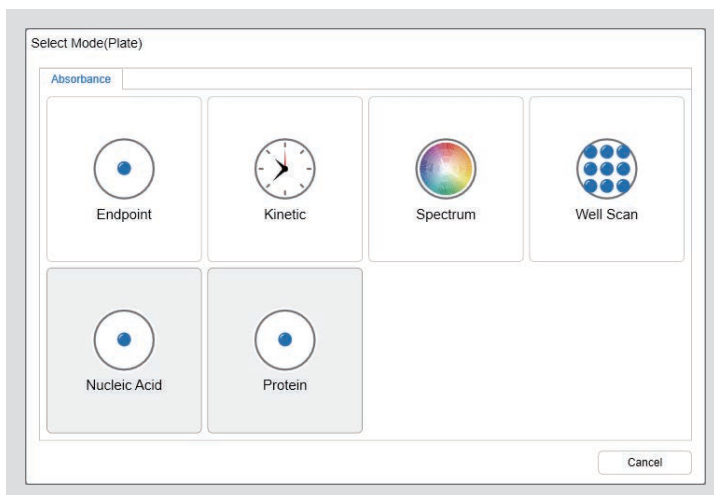
2. Experiment start

Start the experiment by creating a new plate.



2.1 Mode select

Select the mode to measure.



Endpoint: Measures absorbance at the specified wavelength.

Kinetic: Measures absorbance at the specified wavelength and time interval.

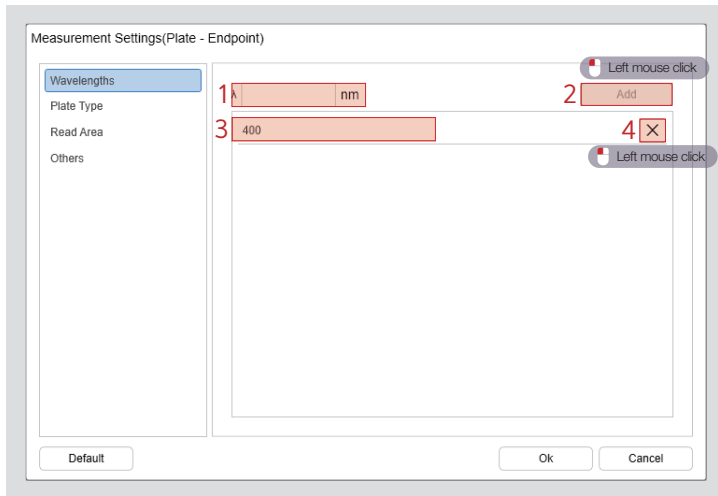
Spectrum: Measures absorbance at the specified wavelength range and interval.

Well Scan: Measures absorbance at the specified wavelength, the number of measuring points per well, and the interval.

2.2 Measurement settings

2.2.1 Wavelength (Endpoint, Kinetic, Well Scan)

You can register up to eight wavelengths between 200 nm and 999 nm.



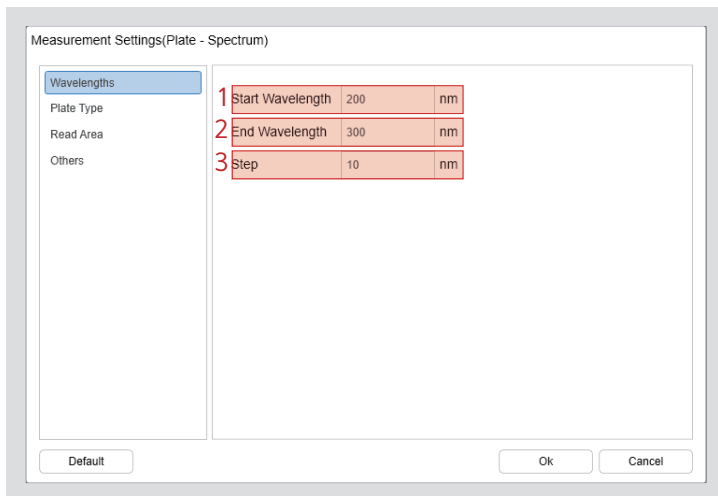
1. Input the wavelength you want to measure. (200-999 nm)
2. Add the wavelength to be measured. (You can add up to eight wavelengths.)
3. Check the added wavelength.
4. Delete the added wavelength.

i Note

- You must add at least one wavelength.
- The specified wavelength will be used as the basic wavelength after the measurement has been set.

2.2.2 Wavelength (Spectrum)

Set the wavelength range and interval.



1. Enter the starting wavelength to measure. (200-999 nm)
2. Enter the ending wavelength to be measured. (200-999 nm)
3. Enter the measured wavelength step. (1-100 nm)

i Note

- The specified wavelength will be used as the basic wavelength after the measurement has been set.

2.2.3 Plate

You can set the plate type or custom plate.

Measurement Settings(Plate - Spectrum)

Wavelengths

Plate Type

Read Area

Others

Plate Type Custom Plate

1 Plate Format 96 Wells

2 Search

3 4ttitude 96 Well Clear Pyramid bottom

96 Well Plate SBS dimensions

1222520

1222520_AF

8030015 Harta - w/o 8032028 adapter

8030015 Harta - with 8032028 adapter

Details

4 Rows : 8 Columns : 12

Plate width : 85480 Plate height : 14350

Default Ok Cancel

1. Select the number of wells on the plate.
2. Find the plate by entering the plate name.
3. Select a plate according to the type of plate you want to measure.
4. Check the details of the selected plate.

2.2.4 Custom plate settings

A plate can be created and defined by the user if there is no plate to be measured in the "Plate" section.

Measurement Settings(Plate - Spectrum)

Wavelengths

Plate Type

Read Area

Others

Plate Type Custom Plate

Plate Format Add Edit Remove

Search

Details

Default Ok Cancel

Add: Adds a user-defined plate.

Edit: Edits the added user-defined plate information.

Remove: Deletes the added user-defined plate.

Custom Plate

1 Name

Manufacture

Display Filter Microplate

Plate details

Number of rows 12 Number of columns 8

Plate width 0 μm Plate length 0 μm

Plate height 0 μm Stacked height μm

Plate Lid Adds μm Include Lid Params

Wells Details

Left top Y 0 μm Left top X 0 μm

Right bottom Y 0 μm Right bottom X 0 μm

Diameter 0 μm

2 Well diagram

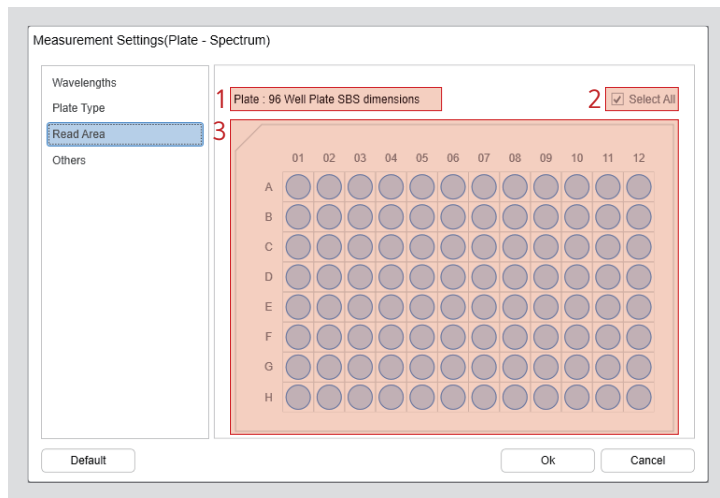
Default Ok Cancel

1. Enter the provided information for the plate you want to use on the screen.

2. Confirm the information you entered.

2.2.5 Measurement area setting

Set the area to measure on the selected plate.



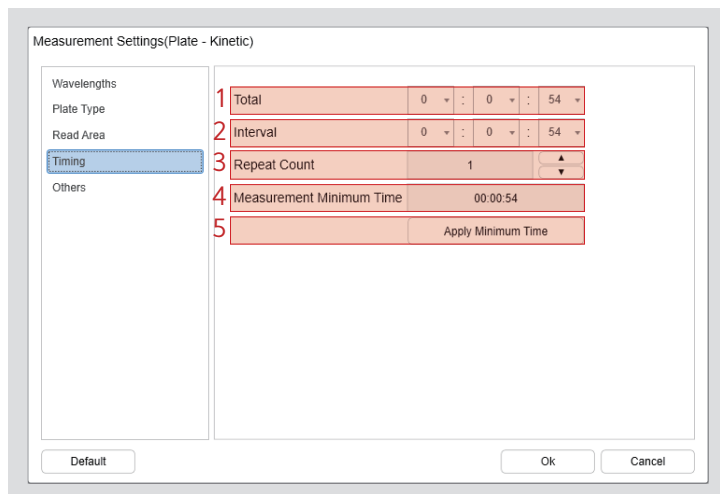
1. Show the selected plate name.
2. Select or clear the entire plate area.
3. Drag the mouse to set the plate area.

Note

You can partially set the desired area by holding down the Ctrl key and dragging the mouse.

2.2.6 Time (Kinetic)

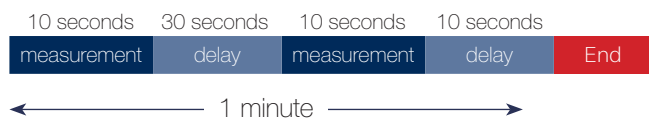
Set the kinetic measurement time.



1. Measure total time.
2. Measure interval time.
3. Count the number of iterations in interval time versus total time. The total time compared to the interval time will be automatically calculated if you use the button on the right to increase or decrease the number of repetitions.
 - Interval Time (00:01:11) X Number of Iterations (Two) = Total Time (00:02:22)
4. The minimum time for one measurement to be completed is calculated and displayed in consideration of the wavelength, measurement area, and measurement speed.
 - The mode cannot be created if the total time and interval time is less than the measurement minimum time.
5. Minimum time applied.
 - The minimum time required for measurement for the current setting is set as the interval and the total time is automatically calculated by applying the number of iterations.

Note

ex) Total Time (One Minute) / Interval (40 Seconds) =
Number of Repetitions (One)



ex) Total Time (One Minute, 20 Seconds) / Interval (40 Seconds) = Number of Repetitions (Two)



2.2.7 Well Scan

Set up the Well Scan measurement method.

Measurement Settings(Plate - Well Scan)

Wavelengths
Plate Type
Read Area
Well Scan
Others

1 Equally space points within the well

2 Number of points 3 X 3

3 Point spacing (microns) 1651 1651

4 Well diameter 6604 microns
Probe diameter 1400 microns

5 Ignore well and carrier limitations

Default Ok Cancel

- Set the interval between wells to be the same.
 - When Checked: The point interval is automatically calculated using the well diameter, probe diameter, and the number of points.
 - When Unchecked: The user can manually input the point interval; the number of points can also be set differently in width and height.
- The number of points you specify will determine the number of points that are measured during the Well Scan.
 - $3 \times 3 = 9$ points to measure.
- Point interval refers to the point-to-point interval in one well.
- Well diameter and probe diameter are fixed values and cannot be changed.
- Ignore well and carrier limitations
 - When Checked: The point will be displayed on the screen even if it is outside the well.
 - When Unchecked: The point will not be displayed on the screen if it is outside the well.

Note

Equally space points within the well

Number of points 5 X 5

Point spacing (microns) 1083 1083

Well diameter 6500 μ

Probe diameter 1400 μ

Ignore well and carrier limitations

Uncheck Ignore Well and Carrier Limitations

Equally space points within the well

Number of points 5 X 5

Point spacing (microns) 1083 1083

Well diameter 6500 μ

Probe diameter 1400 μ

Ignore well and carrier limitations

Check Ignore Well and Carrier Limitations

2.2.8 Other(Endpoint, Kinetic, Well Scan, Spectrum, Common)

Endpoint, Kinetic, Well Scan

Set other required options for measurement.

1. Measure the path length and calculate the ABS based on the optical path length (1 cm) from the OD value.
2. Calculate the absorbance as $(A_{970_Plate} - A_{900_Plate}) / K\text{-Factor}$ after you have calculated the measurement area with wavelengths of 900 and 970.
3. Path length can be calculated using $A_{977_Cuv} - A_{900_Cuv}$ values instead of K-Factor by measuring A_{977_Cuv} and A_{900_Cuv} values using Cuvette.
4. Select the measurement speed.
5. After measuring one well, set the waiting time until measuring the next well.

Spectrum

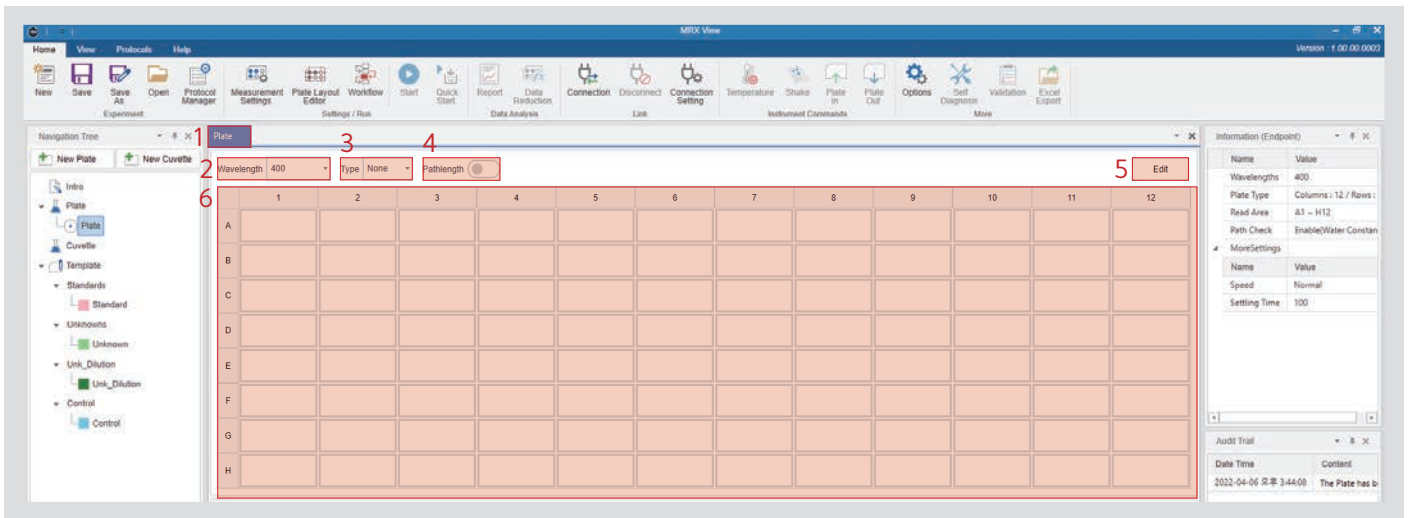
Calibration

- When checked, the baseline is continuously measured for every wavelength measurement.
- When unchecked, the baseline is only measured for the first wavelength measurement.

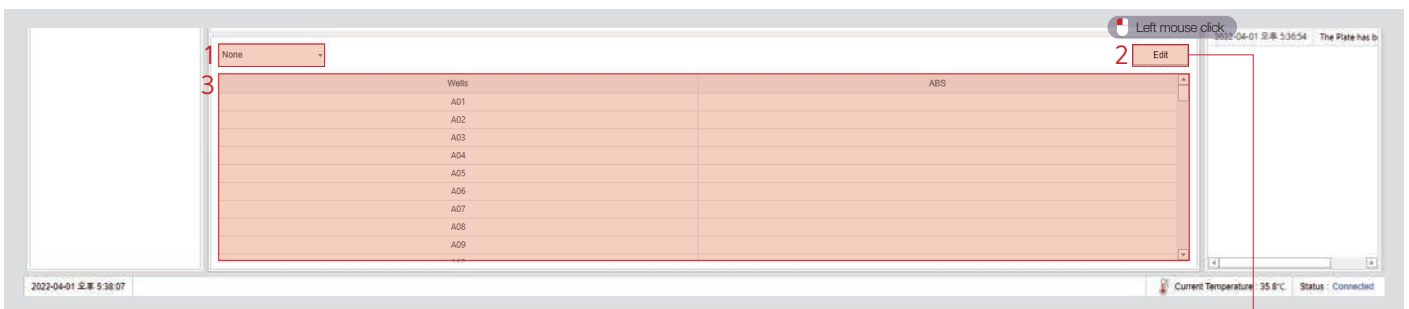
Common

1. Change the measurement settings to the default values.
2. Cancel the measurement settings.
3. Complete the measurement setup and create the plate.

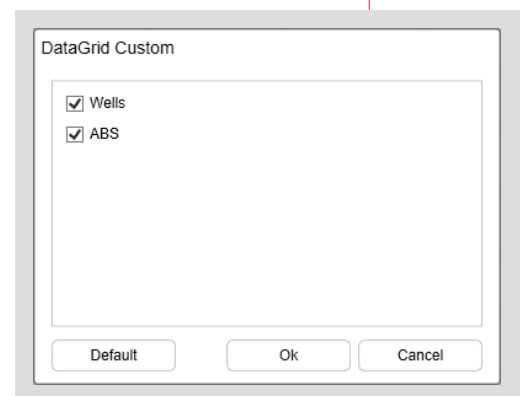
3. Basic plate configuration



1. Name the plate.
2. Check the data by selecting the measured data by wavelength.
3. Check the data by selecting the measured data by type.
 - None: Measurement source data
 - Blank: When specifying a blank area in the layout, the blank area is calculated as the average of the measured values in the designated area (measured value – blank value) and displayed on the screen.
4. The OD value will be calculated as the ABS value and displayed on the screen when the optical-path is activated.
5. The plate editor layout will be displayed on the screen.
6. Measurement data, layout area, color effect, etc. will be displayed on the screen.



1. Select the type of detailed measurement data.
2. Select only the columns you want to view the detailed measurement data.
3. Detailed measurement data is displayed on the screen.



3.1 Description of detailed measurement data #2

Unk_Dilution										Edit
Sample	Wells	Value	R	Result	MeanResult	SD	CV	Dilution	AdjResult	

Sample: Sample number specified by the user

Wells: Well number

Value: Absorbance

R: Whether the minimum or, maximum of the standard sample is out of range

Result: Concentration value calculated by substituting the standard curve

MeanResult: Mean absorbance per sample

SD(Standard Deviation): Standard deviation

CV(Coefficient of Variation): Standard deviation / mean

Dilution: User-specified dilution factor

Adj(Adjustment)Results: Mean / dilution factor

Control					Edit
Sample	Wells	Sample#	Value	MeanValue	

Sample: Sample number specified by the user

Wells: Well number

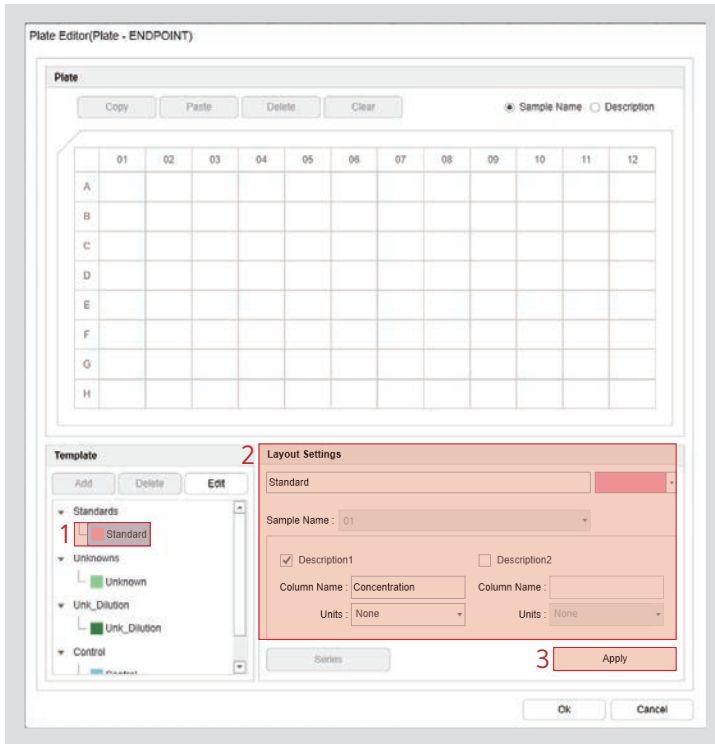
Sample#: index by sample

Value: Absorbance

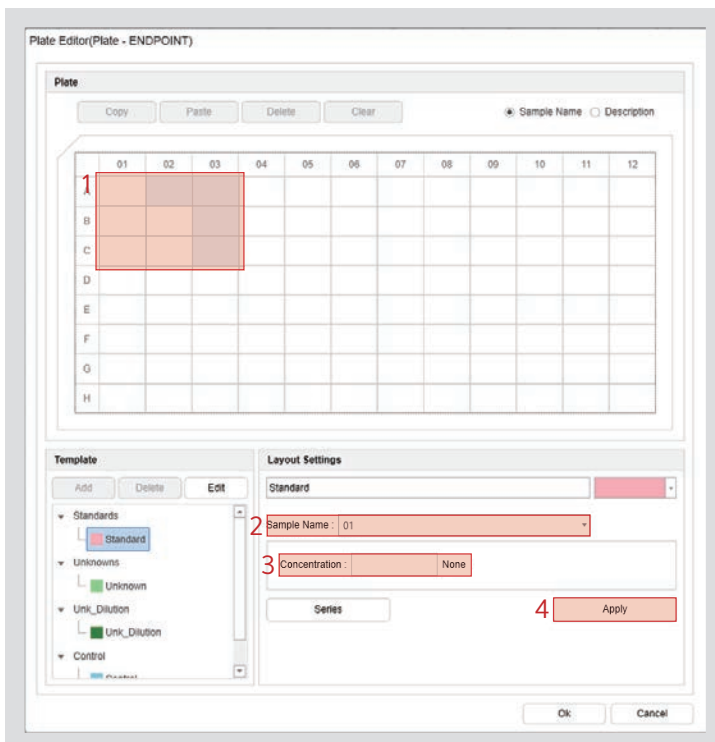
MeanValue: Absorbance mean for each sample

4. Plate layout settings

4.1 Layout settings



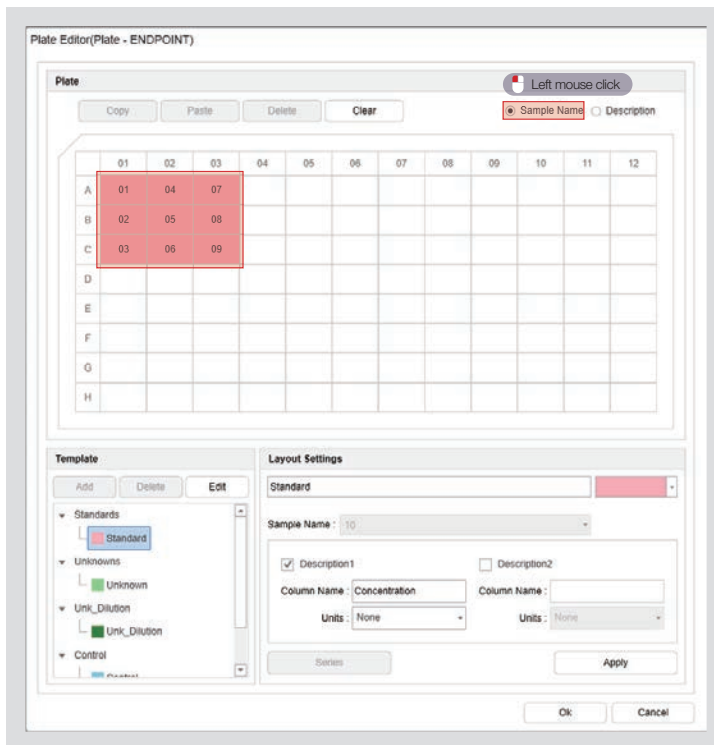
1. Select the layout type.
2. Set the layout information.
 - Layout Name: Set the layout name.
 - Layout Color: Set the layout color.
 - Comment 1: Enter an additional description for the sample.
 - Comment 2: Enter an additional description for the sample.
3. When clicked, the layout setting information will be applied.



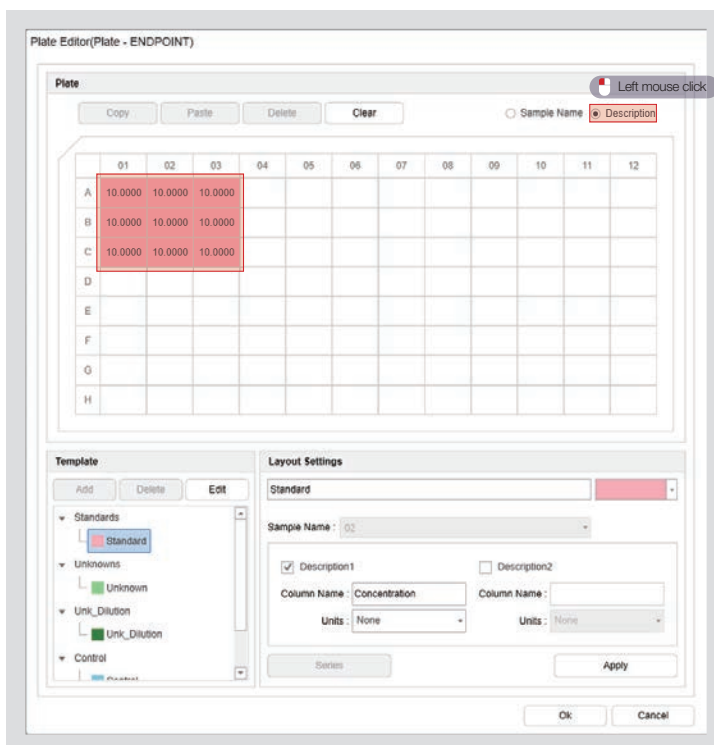
1. Drag the mouse to set the layout area.
2. Set the sample name.
3. Set the value for the additional sample descriptions.
4. Set the sample information in the area.

4.2 Plate Editor

4.2.1 Check Layout Results

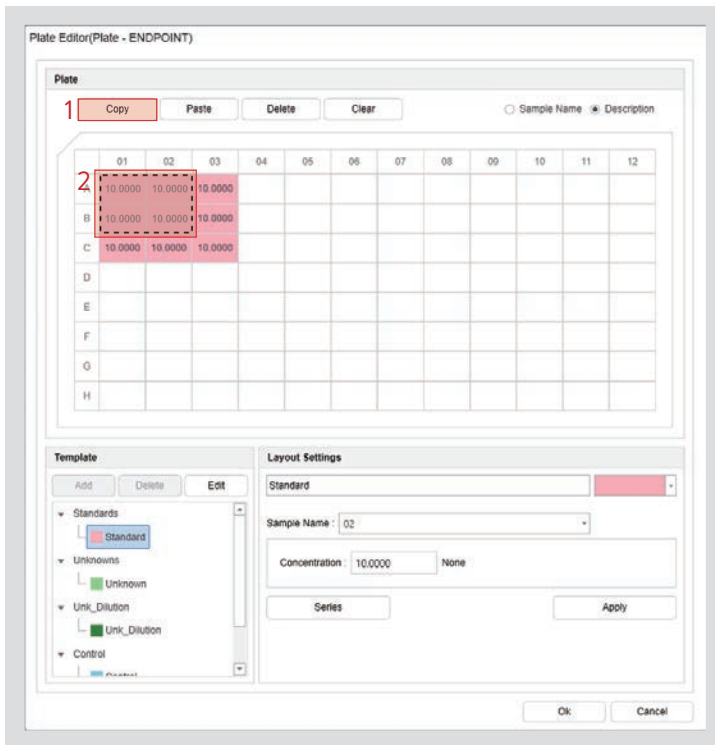


Display the sample color and name.

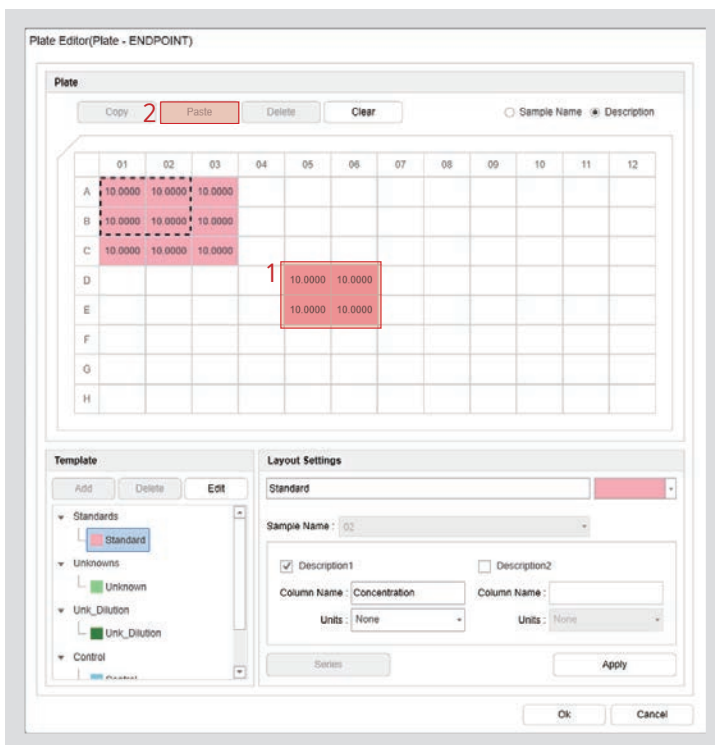


Display the value entered in the description.

4.2.2 Copy Layout Area



1. Designate the area to be copied and click “Copy” or hit Ctrl + C.
2. The area to be copied is displayed.



1. Click “Paste” after selecting the well to paste.
2. Paste it in the lower right direction based on the selected well.

4.2.3 Check Layout Results

Plate Editor(Plate - ENDPOINT)

Plate

Copy Paste Delete Clear Sample Name Description

	01	02	03	04	05	06	07	08	09	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

Template

Add Delete Edit

Standards

- Standard

Unknowns

- Unknown

Unk_Dilution

- Unk_Dilution

Control

Layout Settings

Standard

Sample Name : 01

Description1 Description2

Column Name : Concentration Column Name :

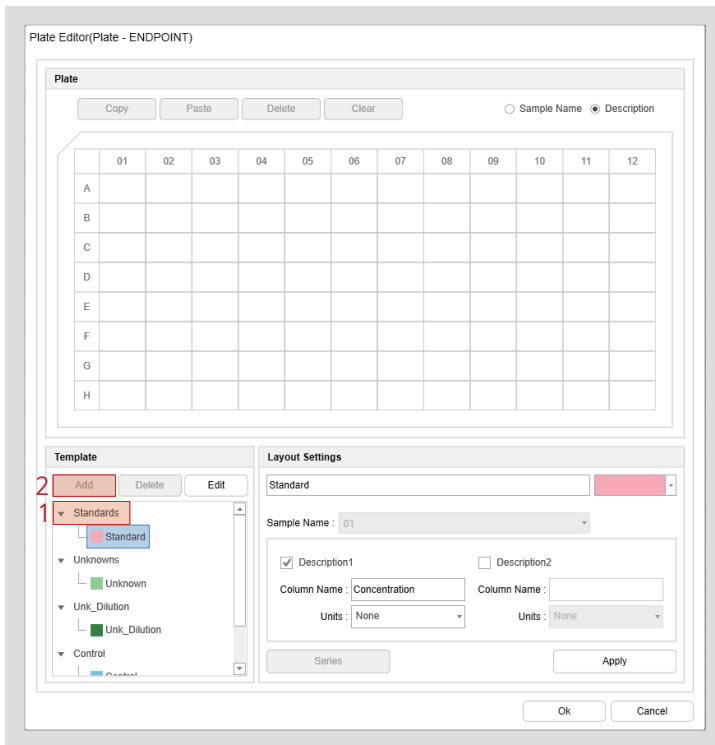
Units : None Units : None

Series Apply

Ok Cancel

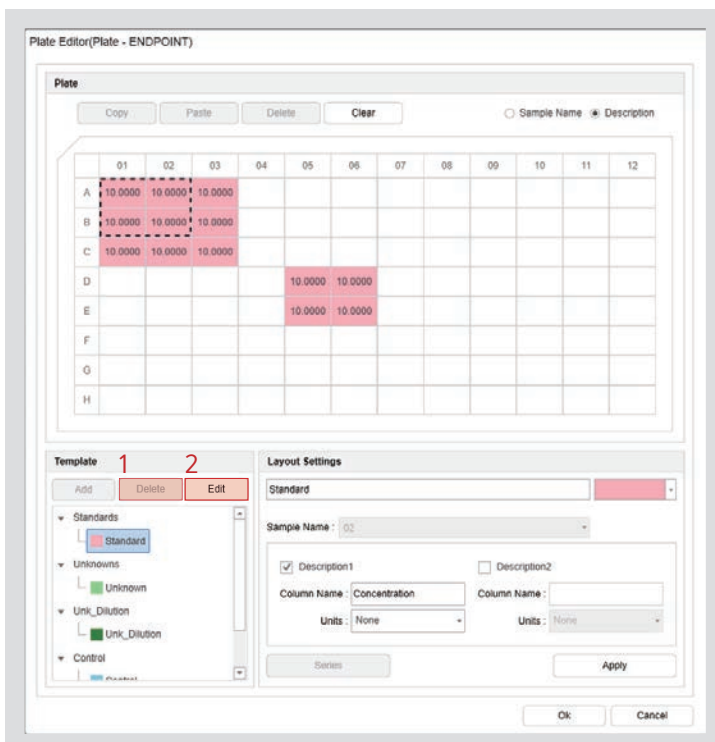
1. Set the area by dragging the mouse to the designated place of the layout. Initialize the settings as much as the dragged area.
2. Initialize the settings for all areas.

4.2.4 Add plate layout



1. Select the title of the plate layout editor.
2. Click "Add" to add a new layout under the selected plate layout editor title.

4.2.5 Deleting and editing plate layouts



1. Delete the layout. (The layout cannot be deleted in an area that has already been set unless the area has been initialized.)
2. You cannot set the layout in the area setting state. Please click "Edit" to cancel the area setting and display the corresponding layout setting window.

4.2.6 Series

This function lets you set the plate area and input sample information in the given pattern.

The 'Series' dialog box contains the following elements:

- Series Layout:**
 - Direction: Top to Bottom, Bottom to Top, Left to Right, Right to Left.
 - Pattern of Replicates: X - Direction (1 Wells), Y - Direction (1 Wells).
- Sample Information:**
 - Start Sample Name: 01
 - Starting Value: 1.000
 - Concentration: (empty)
 - Step by: + 1.000

1. Select the direction in which to input the sample information for the repeating pattern in the area set for the series repeating pattern direction.
2. Determine the repeating pattern of the sample information with the given X and Y values.
3. Enter the starting sample name.
4. Apply the details for the starting value of the sample information and the formula (*, /, +, -) for each pattern step.

Note

	01	02	03	04	05	06	07
A	01	01	05				
B	02	02	06				
C	03	03	07				
D	04	04	08				
E							
F							
G							
H							

	01	02	03	04	05	06	07
A	1.0000	1.0000	5.0000				
B	2.0000	2.0000	6.0000				
C	3.0000	3.0000	7.0000				
D	4.0000	4.0000	8.0000				
E							
F							
G							
H							

1. The starting sample name increases from top to bottom and repeats the pattern based on the repeating pattern of X and Y.
2. The value is calculated by applying the step-by-step calculation formula based on the starting value of the sample information. The pattern is repeated based on the repeating pattern of X and Y.

5. Connection

5.1 Connection settings

Set the information to connect with the equipment.

The screenshot shows the MRX View software interface. The 'Connection Setting' dialog box is open, displaying the following information:

- IP:** 192.168.0.5
- Port:** 8123
- Automatic connection:**
- Buttons:** Device Search, Ok, Cancel

Numbered callouts in the original image point to the IP/Port fields (1), the Automatic connection checkbox (2), and the Device Search button (3).

1. Check the IP address and port to be connected to the equipment. (Port 8123 fixed)
2. The program will automatically attempt to connect to the equipment when the automatic connection is set.
3. Use "Device Search" to set the IP address of the equipment if the one that needs to be connected does not match.

5.1.1 Device Search

Find the network information for the connected equipment.

The screenshot shows the 'Device List' dialog box with the following table:

MAC	IP Address	Mask	Gateway	DHCP
68:27:19:ab:fd:a5	192.168.0.5	255.255.255.0	192.168.0.1	O

Buttons at the bottom: IP Settings, Ok, Cancel

1. The equipment list window will be displayed on the screen when searching for equipment.
2. The equipment's network information will be displayed on the list if the equipment is properly connected to the network.
3. Check the network information of the equipment. If it is determined that a connection is possible, click the list with your mouse and click "OK."
4. Set the network information by matching the band with the PC network through IP settings if the network band is different according to the DHCP (automatic IP assignment) among the network information of the equipment. (Refer to the equipment connection procedure.)

5.1.2 IP settings

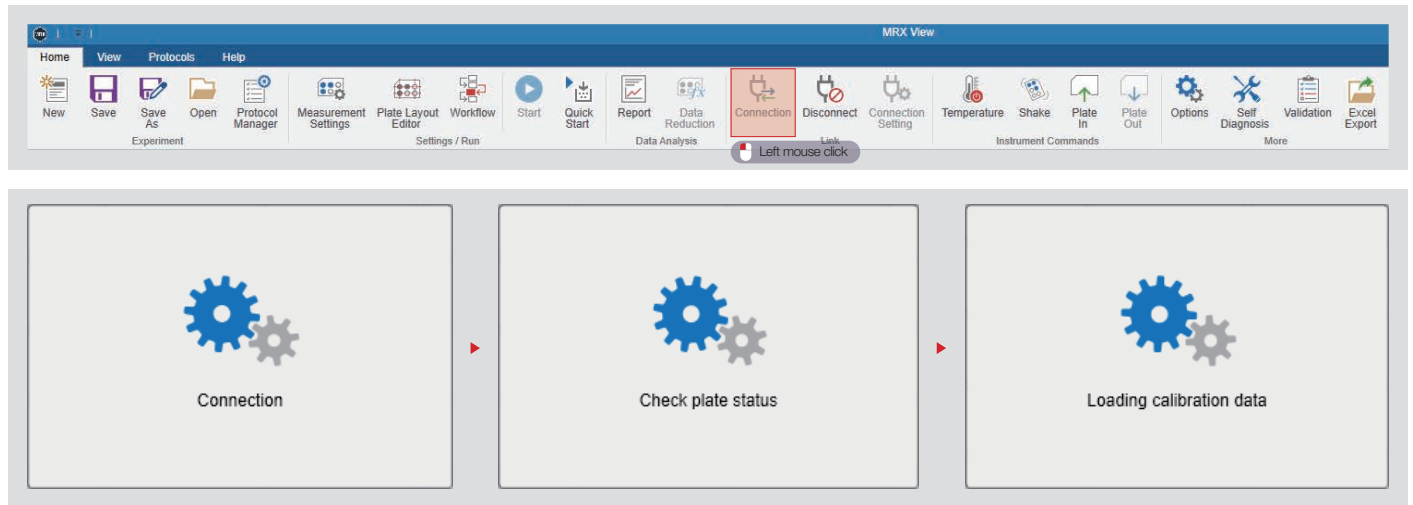
Set the IP address of the equipment to be connected to the PC.

The image displays two screenshots of the 'IP Settings' dialog box. The left screenshot shows the 'DHCP' checkbox checked, with a red box and the number '1' next to it. The 'MAC' field contains the value '04:91:62:f0:89:b4'. The 'IP', 'Mask', and 'Gateway' fields are empty. The right screenshot shows the 'DHCP' checkbox unchecked, with a red box and the number '2' next to it. The 'MAC' field contains '04:91:62:f0:89:b4'. The 'IP' field contains '192.168.2.100', the 'Mask' field contains '255.255.255.0', and the 'Gateway' field contains '192.168.2.1'. A red box and the number '3' are next to the IP, Mask, and Gateway fields. Both screenshots have 'Ok' and 'Cancel' buttons at the bottom.

1. The equipment will automatically be assigned an IP address from the connected router if DHCP is checked.
2. You can directly enter the network information below if DHCP is not checked.
3. Enter the IP address, subnet mask, and gateway to connect to the PC to set the network information for the equipment.

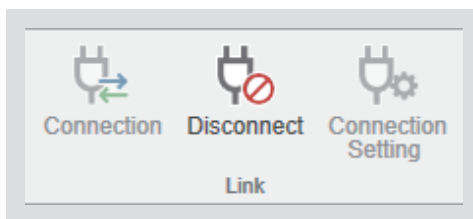
5.2 Connect

Connect with the equipment.



Connection with equipment > Check plate status > Recall calibration information When all three steps are completed, it is judged that the connection with the equipment has been completed successfully.

Note

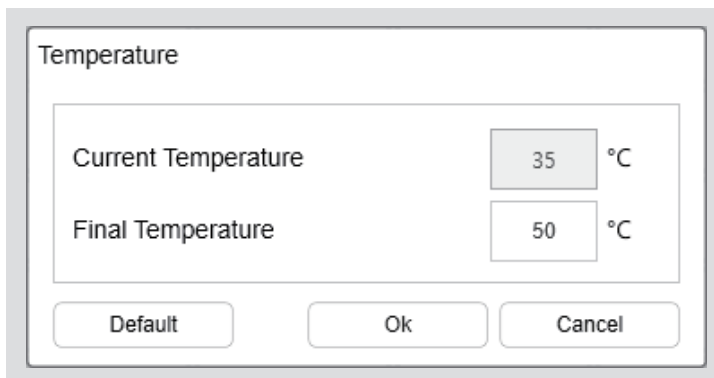
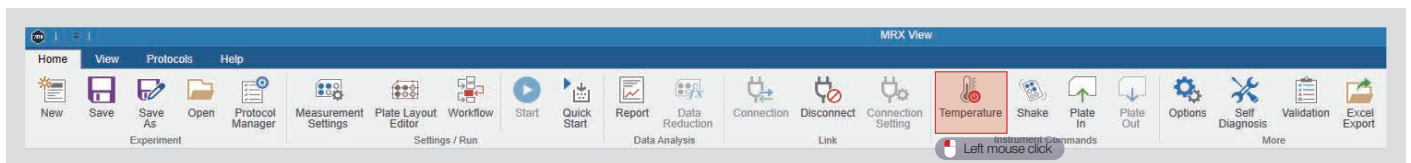


1. When the connection is complete, the connect button is deactivated and the disconnect button is activated.
2. You can also confirm that the equipment is connected with the phrase "Connected" at the bottom right of the program.

6. Other features

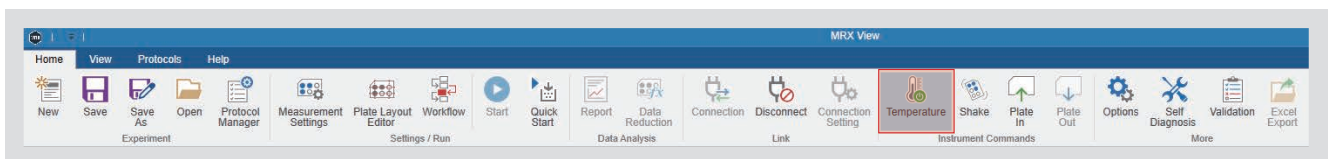
6.1 Temperature

Adjust the temperature of the equipment.



1. Click "Temperature" to display the temperature window on the screen.
2. Check the current temperature and enter the maximum temperature you want to reach.
3. The current and final temperature will be displayed in the lower right corner of the program. The displayed information will indicate that the temperature is being controlled.

Note



The icon will change from red to green as you control the temperature. Click the green icon to terminate the process.

Note

Procedure

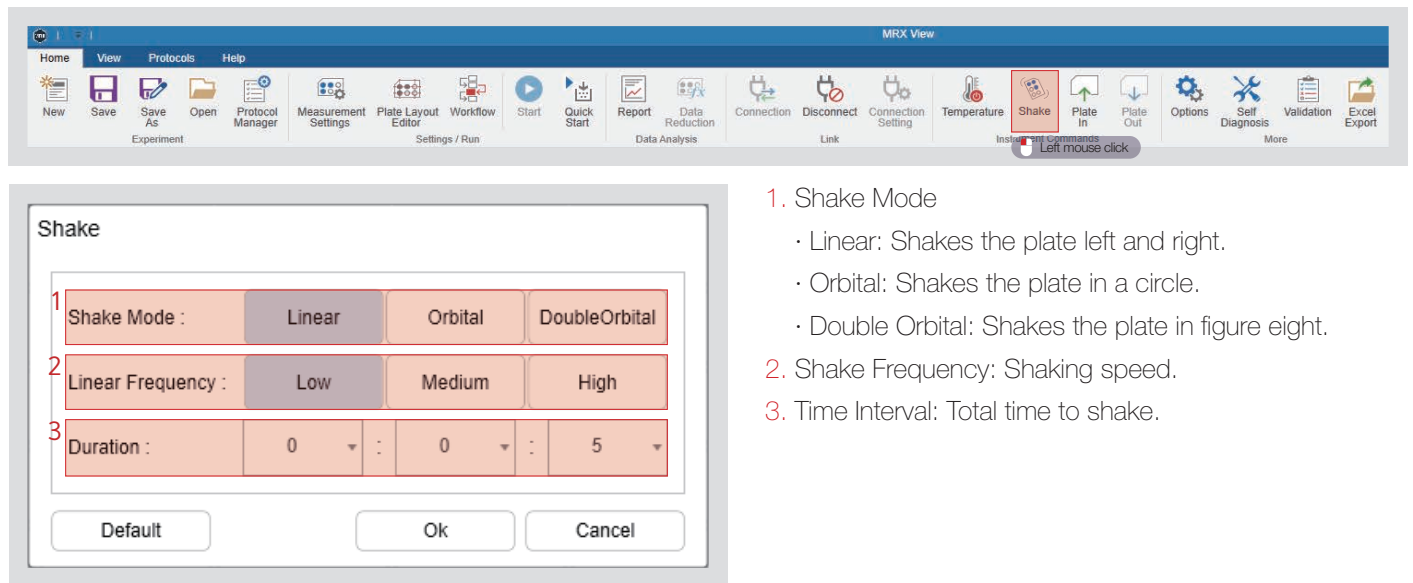
Case 1. Set Final Temperature → Control Temperature → Reach Final Temperature → Automatically Shut Down Temperature

Case 2. Set Final Temperature → Control Temperature → Manually Shut Down Temperature

* The final temperature can only be entered from 1-60°C (33.8-140°F).

6.2 Shake

This function shakes the sample in the inserted plate.



The screenshot shows the MRX View software interface with the Shake dialog box open. The dialog box contains the following settings:

- 1. Shake Mode: Linear (selected), Orbital, DoubleOrbital
- 2. Linear Frequency: Low (selected), Medium, High
- 3. Duration: 0, 0, 5

Buttons: Default, Ok, Cancel

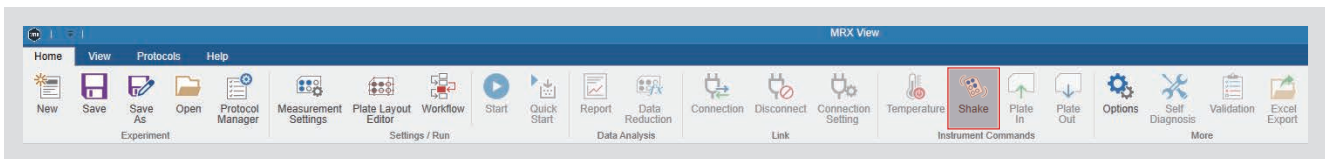
1. Shake Mode

- Linear: Shakes the plate left and right.
- Orbital: Shakes the plate in a circle.
- Double Orbital: Shakes the plate in figure eight.

2. Shake Frequency: Shaking speed.

3. Time Interval: Total time to shake.

Note



Click "Shake" once more during the shaking process to terminate the shak.

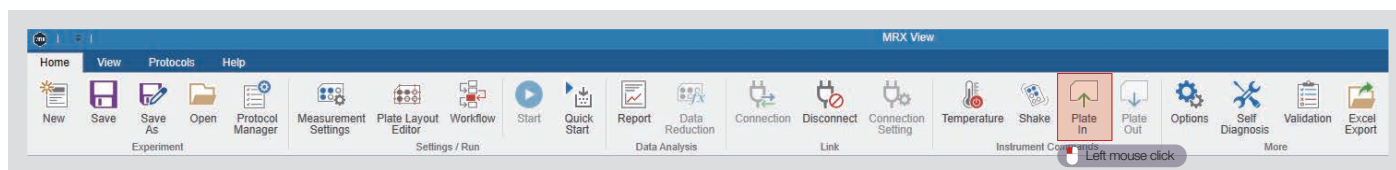
Note

Procedure

Case 1. Set Shake Options → Insert Plate → Start Shake → Automatically End Shake → Eject Plate

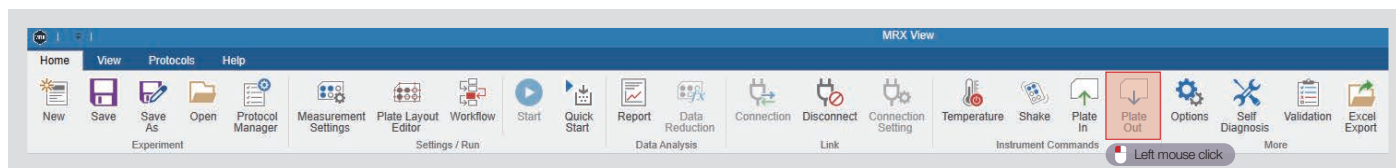
Case 2. Set Shake Options → Insert Plate → Start Shake → Manually End Shake → Eject Plate

6.3 Plate In



Plates can only be inserted into the equipment if they are placed on the outside. Click "Plate Retract" to insert the plate into the equipment.

6.4 Plate Out

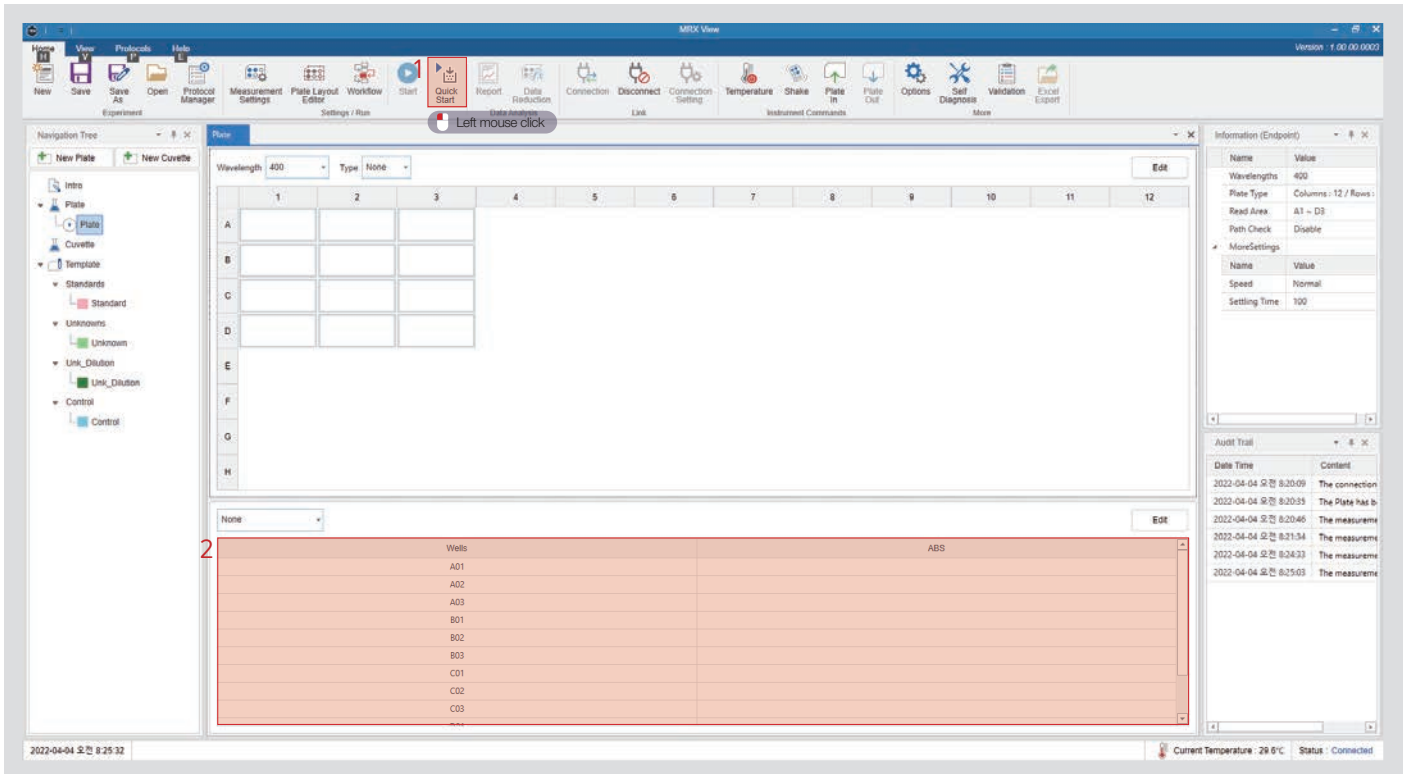


The plate can only be ejected if it has been inserted into the equipment. Click "Eject Plate" to remove the plate from the equipment.

7. Measure

7.1 Quick start #1

Measure plate through quick start.



1. Measure the plate by pressing the quick start button.
 2. Real-time data is displayed on the screen when the measurement is performed.
- * The measured data will be lost if you cancel during measurement.

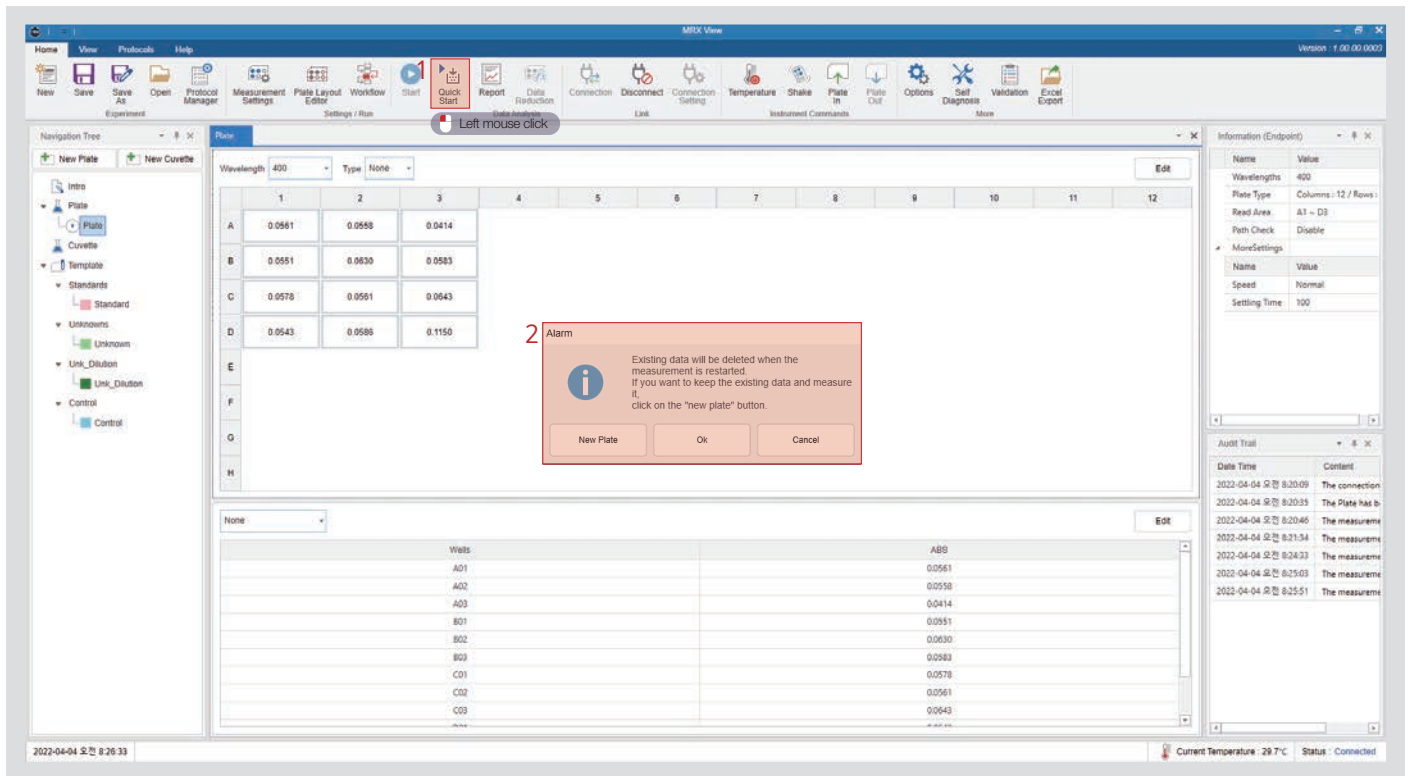
i Note

Procedure

- Case 1. Check Plate Status → Plate in Equipment → Eject Plate → Alarm to Insert Plate to Measure → Measurement Settings → Measure → Eject Plate
- Case 2. Check Plate Status → Plate Removed from Equipment → Alarm to Insert Plate to Measure → Measurement Settings → Measure → Eject Plate
- Case 3. Check Plate Status → Plate Removed from Equipment → Alarm to Insert Plate to Measure → Measurement Settings → Measure → Cancel Measurement → Eject Plate

7.1 Quick start #2

If there is data to be measured, a notification will pop up with information on how to display the next measurement data.



1. Measure the plate by pressing the quick start button.
2. New Plate: Makes a copy of the current plate and shows the measurement data for the copied plate.
 OK: Deletes existing data and overwrites it with new measurement data.
 Cancel: No measurement is performed.

7.1 Quick start #3

This is the result screen when measuring with a new plate.

The screenshot displays the MRX View software interface. The main window shows a 96-well plate layout with measurement data for a 'Copy_of_Plate' at a wavelength of 400 nm. The data is organized into rows A through H and columns 1 through 12. The 'Copy_of_Plate' is highlighted in the navigation tree on the left. The right-hand side of the interface shows the 'Information (Endpoint)' and 'Audit Trail' panels.

Wavelength	400	Type	None									
	1	2	3	4	5	6	7	8	9	10	11	12
A	0.0555	0.0560	0.0409									
B	0.0550	0.0629	0.0580									
C	0.0577	0.0561	0.0642									
D	0.0543	0.0588	0.1151									
E												
F												
G												
H												

None	Wells	ABS
	A01	0.0555
	A02	0.0560
	A03	0.0409
	B01	0.0550
	B02	0.0629
	B03	0.0580
	C01	0.0577
	C02	0.0561
	C03	0.0642
	D01	0.0543
	D02	0.0588
	D03	0.1151

The 'Information (Endpoint)' panel shows the following details:

- Name: Value
- Wavelengths: 400
- Plate Type: Columns: 12 / Rows: 8
- Read Area: A1 - D3
- Path Check: Disable
- MoreSettings:
 - Name: Value
 - Speed: Normal
 - Setting Time: 100

The 'Audit Trail' panel shows a list of events:

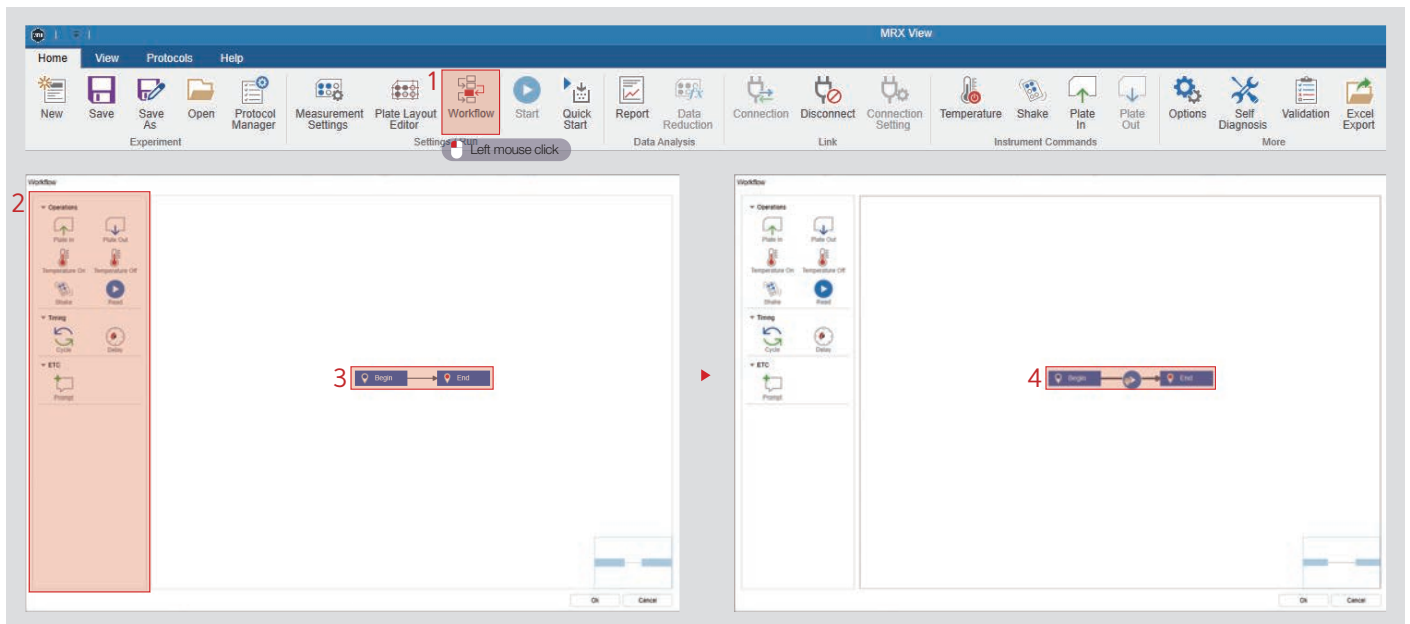
Date Time	Content
2022-04-04 오전 8:20:09	The connection
2022-04-04 오전 8:20:35	The Plate has b
2022-04-04 오전 8:20:46	The measurem
2022-04-04 오전 8:21:54	The measurem
2022-04-04 오전 8:24:33	The measurem
2022-04-04 오전 8:25:03	The measurem
2022-04-04 오전 8:25:51	The measurem
2022-04-04 오전 8:28:06	The Copy_of_Pl
2022-04-04 오전 8:28:09	The measurem

At the bottom of the interface, the status bar shows: 2022-04-04 오전 8:28:45, Current Temperature: 29.7°C, Status: Connected.

You can check to ensure that the measurement data is displayed on the screen by copying an existing plate and adding the keyword "Copyof" to create a new plate.

7.2 Workflow #1

This function creates a workflow when measuring and ensures that measurements are performed according to the proper procedure.



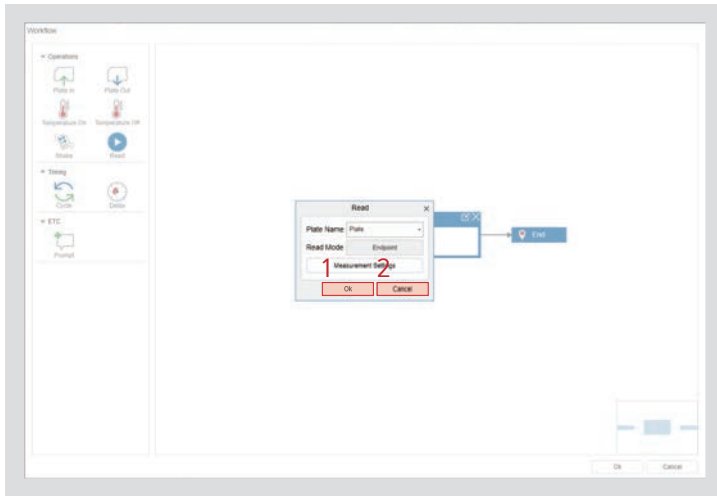
1. Click "Workflow" to display the workflow window on the screen.
2. Items that can be put into the workflow.
3. Indicates the current workflow.
4. You can insert a workflow item by clicking it with the mouse and dragging and dropping it to the designated workflow line.

i Note

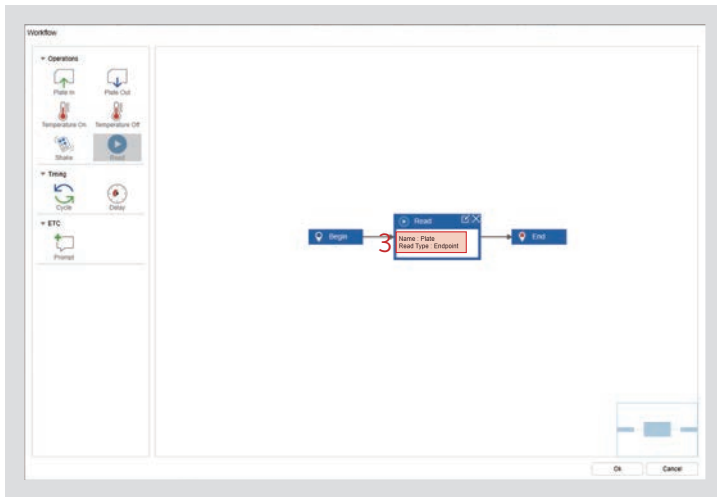
There must be at least one measurement flow for execution when creating a workflow.

7.2 Workflow #2

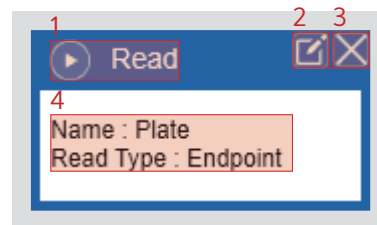
A window is displayed that inserts a flow and allows you to select options for the flow.



1. Apply the flow upon confirmation.
2. The flow will not be applied if the workflow has been canceled.



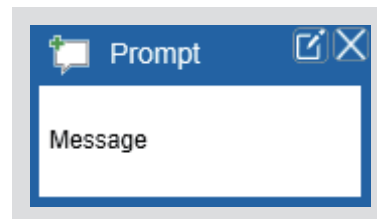
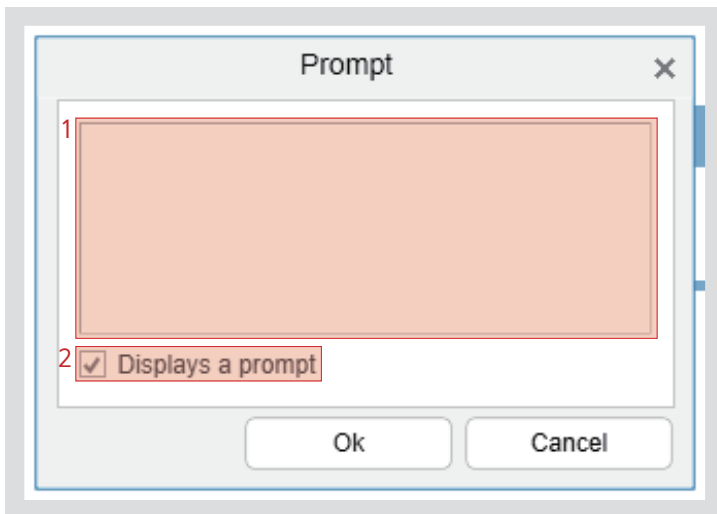
This screen shows where the flow is applied at the time of confirmation.



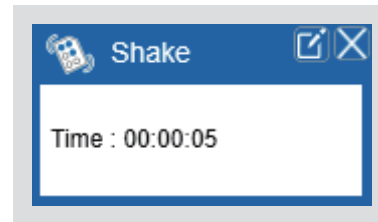
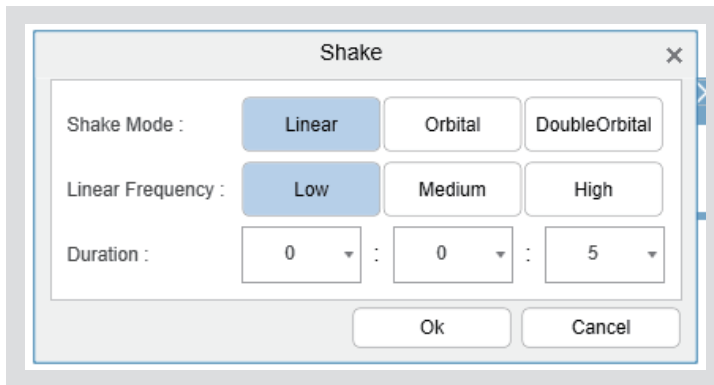
1. Indicates the flow icon and name.
2. Edit the options of the flow.
3. Delete the flow.
4. Indicates the option information of the flow.

7.2 Workflow #3

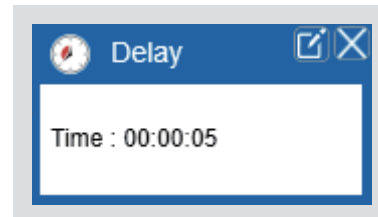
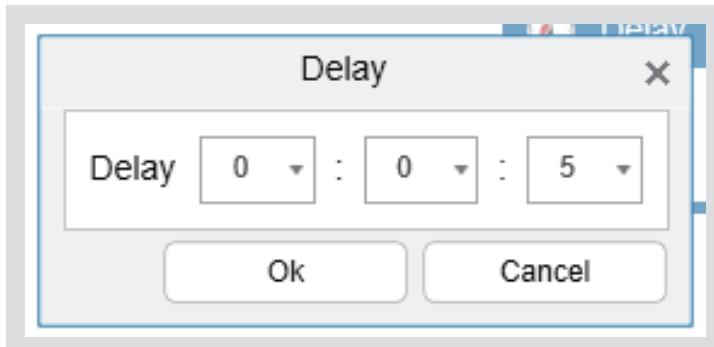
A detailed description of the flow.



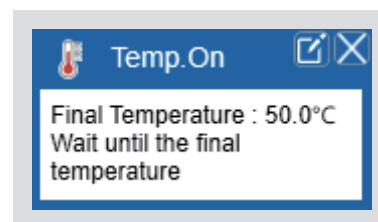
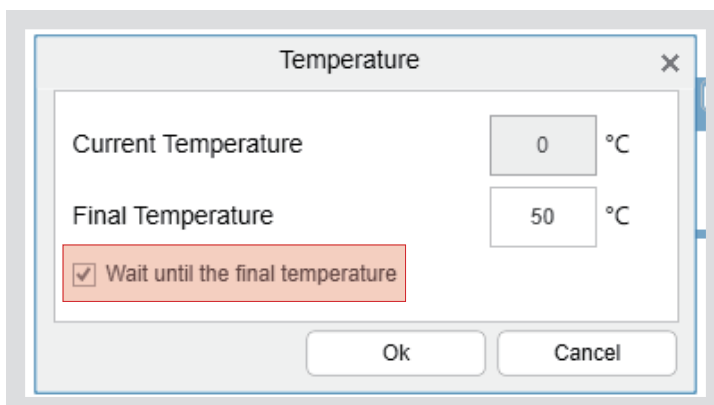
1. Enter your message.
2. A notification will pop up and ask whether you want to show a message when executing a flow.



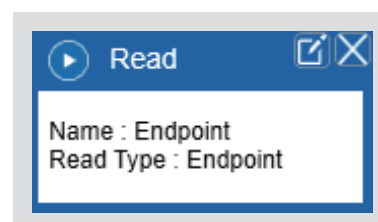
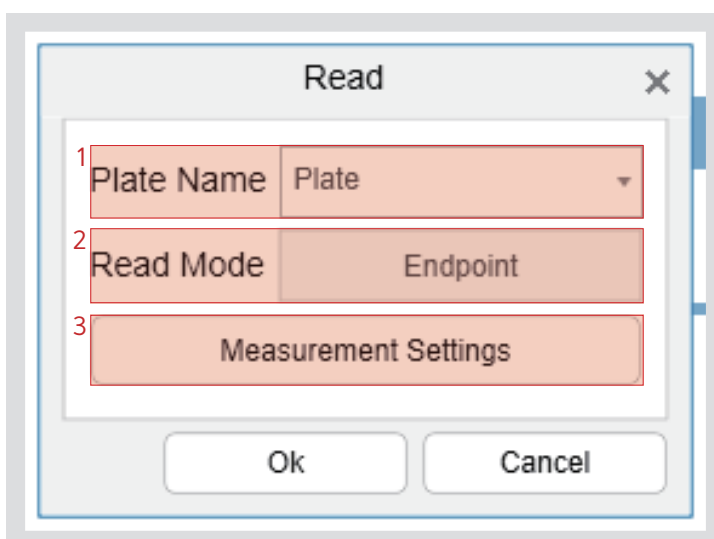
See Page 36: Shake.



- The flow can provide a delay between flow executions.
- If a time delay is encountered during the flow, wait for the set time before proceeding with the next flow.



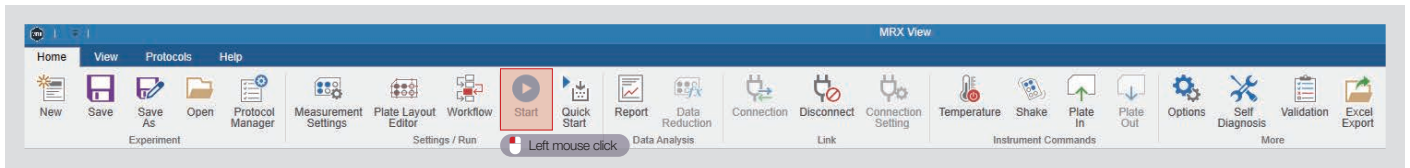
You can select from two options when executing a flow: whether to wait for the flow until the final temperature is reached or whether to proceed with the next flow after only turning on the temperature.



1. Select the plate to be measured.
2. Check the mode of the plate to be measured.
3. You can change the measurement settings by clicking "Measurement Settings."

7.2 Workflow #4

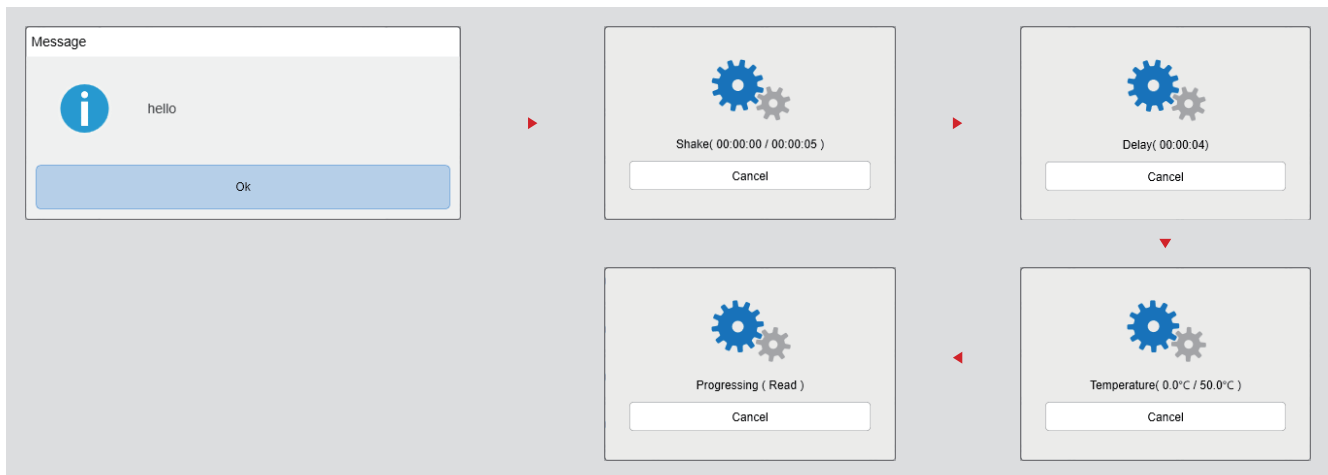
Run the workflow.



- Insert one or more measurements into the workflow to activate “Run.” Click “Run” to start the flow.
- The basic flow is the same as that of the quick start. Measurements will proceed in the order of the created flow for workflows that have options in addition to measurement.

Note

Flow: Start → Message → Shake → Turn on Temperature Sensor → Measure → End



Check Plate Status → Insert Plate to Measure Alarm → Insert Plate → Display Message → Start Shake → End Shake → Control Temperature → Reach Final Temperature → Measurement Settings → Measure → Eject Plate

7.3 Measurement screen description

7.3.1 Endpoint measurement screen and results

You can check the wavelength data by selecting the wavelength.

The screenshot displays the MRX View software interface. The main window shows a 96-well plate grid with columns 1-12 and rows A-H. The selected wavelength is 500 nm, and the absorbance value for all wells is 4.0000. A dropdown menu is open above the grid, showing options for 500 and 600 nm. The right sidebar shows 'Information (Endpoint)' and 'Audit Trail'.

Wavelength	Type	None	Edit
500	None		
600			

Wavelengths	Value
500.600	

Name	Value
Wavelengths	500.600
Plate Type	Columns: 12 / Rows:
Read Area	A1 - D4
Path Check	Disable

Date Time	Content
2022-04-06 09:35:47	The Plate has b
2022-04-06 09:35:55	The connection
2022-04-06 09:35:56	The measurem

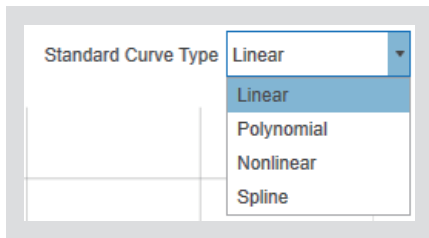
Wells	ABS
A01	4.0000
A02	4.0000
A03	4.0000
A04	4.0000
B01	4.0000
B02	4.0000
B03	4.0000
B04	4.0000
C01	4.0000

Only the absorbance for the wavelength is displayed on the screen.

7.3.2 Endpoint standard curve #1

Various curve fit methods are available in the software. All models define Y as a function of X.

Options: Linear, Polynomial (quadratic, cubic, quartic, quintic, sextic), Nonlinear (4 parameter, 5 parameter), spline



Linear: You can select this option when the concentration of the selected standard is 2 or more.

Linear Regression

Least square technique

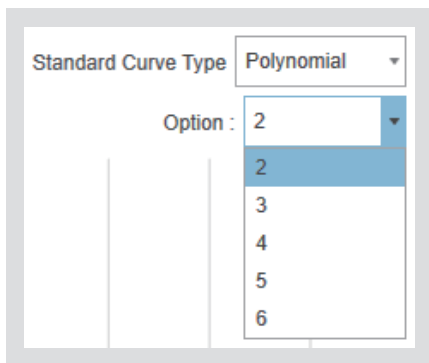
$$y = ax + b$$

y : unknown response

x : expected concentration

a : slope of the linear regression

b : intercept to the y-axis



Polynomial: You can select this option when the concentration of the selected standard is 3 or more.

Polynomial Option (2-6): You can select this option when the concentration of the selected standard is 3 or more.

ex) The optional parameter will be provided up to 5 when the concentration of the selected standard is 6 or more.

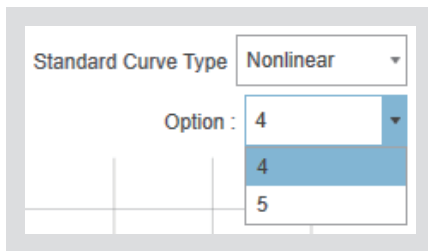
Polynomial Regression

Least: square technique

$$y = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$$

n : degree of the polynomial regression.

7.3.2 Endpoint standard curve #2



Nonlinear: You can select this option when the concentration of the selected standard is 4 or more.

Nonlinear option (4-5): You can select this option when the concentration of the selected standard is 4 or more.

ex) You can select this option when the concentration of the selected standard is 5 or more.

Nonlinear Regression

Iterative calculations

4 Parameter Curve

4 parameter logistic (4PL) model is a symmetrical S-shaped curve with the equation.

$$y = \frac{a - d}{(1 + (x / c)^b)} + d$$

a: absorbance at zero concentration

b: slope of curve at its inflection point

c: value of x at inflection point

d: absorbance at infinite concentration

x: concentration

y: absorbance (OD)

5 Parameter Curve

5 parameter logistic is similar to the 4PL but has an additional parameter, e, which allows it to be asymmetric.

$$y = \frac{a - d}{(1 + (x / c)^b)^e} + d$$

a: absorbance at zero concentration

b: slope of curve at its inflection point

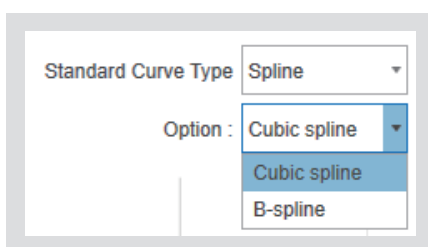
c: value of x at inflection point

d: absorbance at infinite concentration

e: quantifies the asymmetry

x: concentration

y: absorbance (OD)

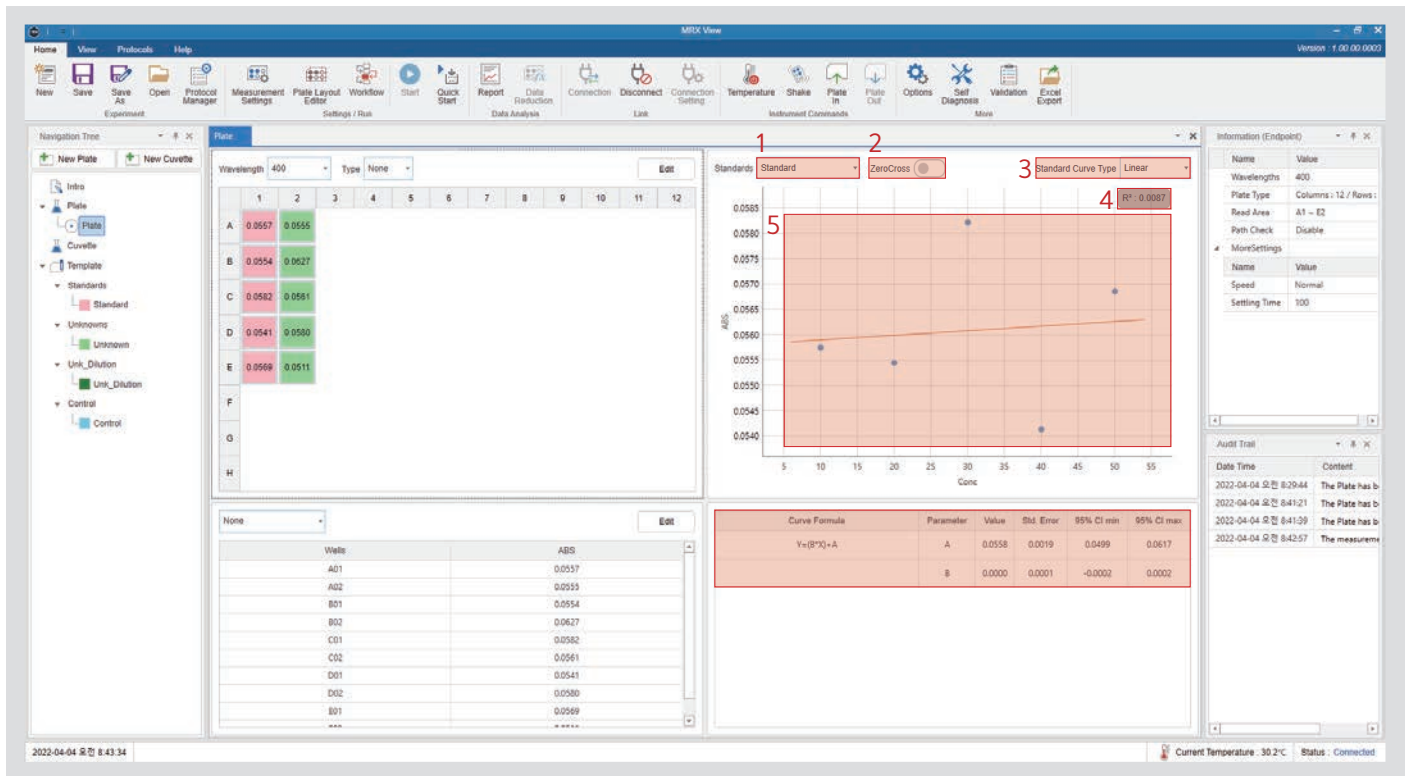


Spline: Curve defined piecewise by polynomials.

Data points are divided by the smoothing factor to become a set of data points, and the larger the smoothing factor, the smoother the curve.

7.3.3 Endpoint standard curve type

A graph will automatically be shown if there are measured data and a standard sample set in the layout.



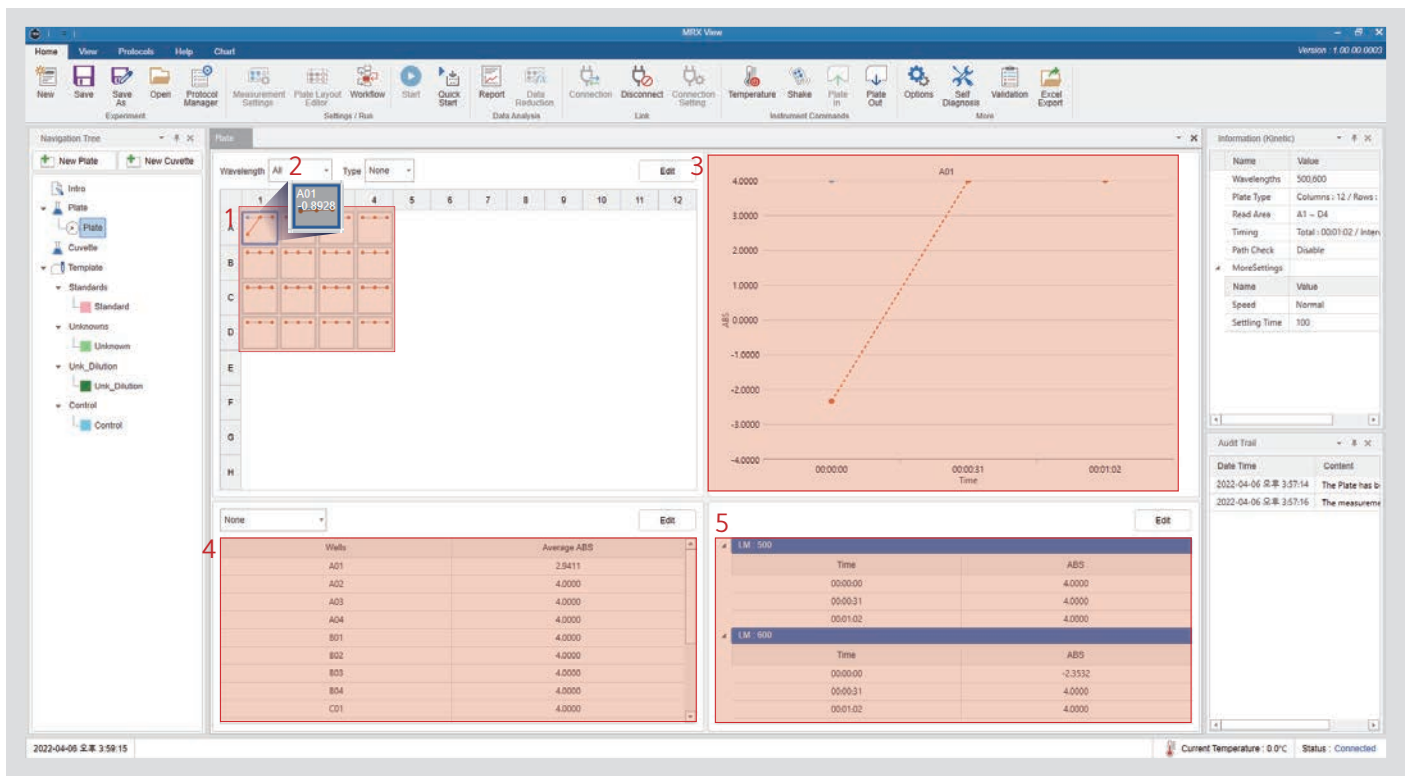
1. A chart will be selected and displayed for each standard sample if there are two or more standard samples with set layouts.
2. Check whether or not to cross the zero point.
3. Select the type of standard curve.
4. This represents the square of the RSQ Pearson product-moment correlation coefficient.
5. A standard curve chart is displayed.

Note

Curve Formula	Parameter	Value	Std. Error	95% CI min	95% CI max
$Y=(B*X)+A$	A	0.0558	0.0019	0.0499	0.0617
	B	0.0000	0.0001	-0.0002	0.0002

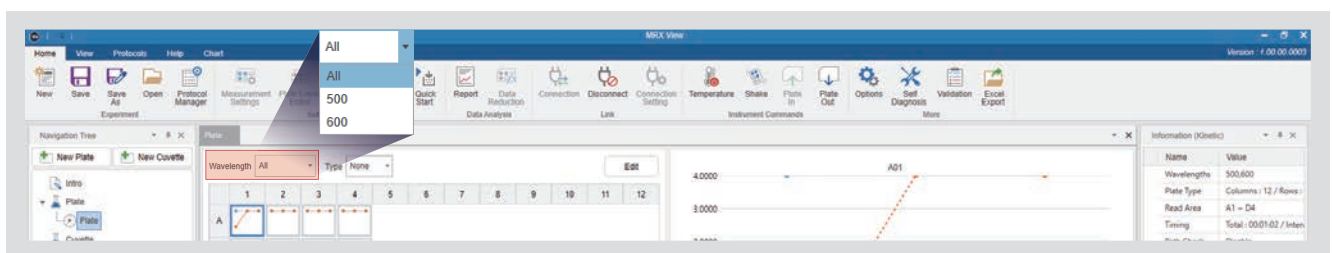
- **Curve Formula:** The formula changes depending on the type and option of the standard curve.
- **Parameter:** The parameter of the standard curve formula.
- **Std. Error:** The average distance between the actual value and the value predicted by the regression model.

7.3.4 Kinetic measurement screen and results (Single, Multi-Wavelengths)



1. Represents a mini-chart for each well of a wavelength.
2. Hover your cursor over a well to see the average absorbance for multi-wavelength measurements.
3. Click the well to view the chart.
4. Indicate the average absorbance per well.
5. Display the absorbance over time for each wavelength of the currently selected well.

Note



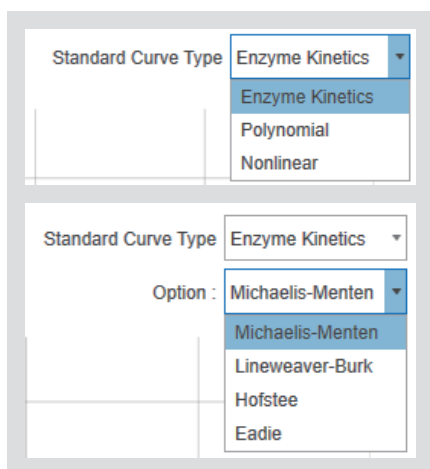
You can check the data by wavelength by selecting the wavelength.

* For multi-wavelength, all wavelengths are integrated into the full mode to present data on the screen.

7.3.5 Kinetic standard curve type #1

Various curve fit methods are available in the software. All models define Y as a function of X.

Options: Enzyme Kinetics (Michaelis-Menten, Lineweaver-Burk, Hofstee, Eadie), Polynomial (quadratic, cubic, quartic, quintic, sextic), Nonlinear (4 parameter, 5 parameter).



Enzyme Kinetics: The enzyme-substrate interaction rates can be accurately evaluated. There are four options for this analysis: Michaelis-Menten, Lineweaver-Burk, Hofstee, and Eadie.

Enzyme Kinetics Models

When an enzyme (E) binds with a substrate (S), an enzyme/substrate (ES) is produced, which can further react and yield a by-product (P), shown in below.



Michaelis-Menten Model

With increasing substrate concentration, the enzyme reactivity will asymptotically approach its maximum velocity.

$$\mathbf{v = \frac{V_{max} \cdot [S]}{K_m + [S]}}$$

v: rate of the enzyme reaction

[S]: substrate concentration

K_m: substrate concentration at half-maximum velocity (Michaelis-Menten constant)

V_{max}: maximum velocity

Hofstee Model

1/v is plotted as a function of 1/[S]. The slope (a) and intercept (b) of the linear curve is calculated by the least-square method.

$$\frac{[S]}{\mathbf{v}} = \frac{\mathbf{1}}{\mathbf{V_{max}}} \cdot [S] + \frac{\mathbf{K_m}}{\mathbf{V_{max}}}$$

$$\mathbf{V_{max} = \frac{1}{a}}$$

$$\mathbf{K_m = b \cdot V_{max}}$$

Eadie Model

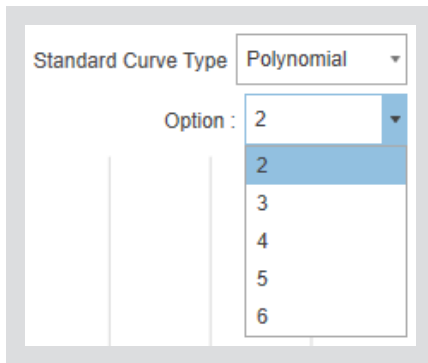
[V] is plotted as a function of v/[S]. The slope (a) and intercept (b) of the linear curve is calculated by the least-square method.

$$\mathbf{v = K_m \cdot \frac{v}{[S]} + V_{max}}$$

$$\mathbf{V_{max} = b}$$

$$\mathbf{K_m = -a}$$

7.3.5 Kinetic standard curve type #2

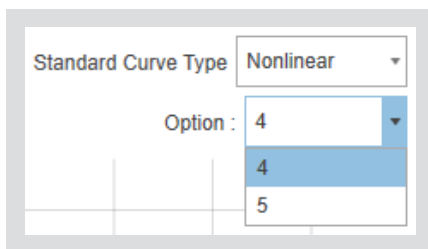


Polynomial: You can select this option when the concentration of the selected standard is 3 or more.

Polynomial Option (2-6): You can select this option when the concentration of the selected standard is 3 or more.

ex) The optional parameter will be provided up to 5 when the concentration of the selected standard is 6 or more.

* For more information, see Polynomial in Chapter 7.3.2 Endpoint standard curve #1, page 39.



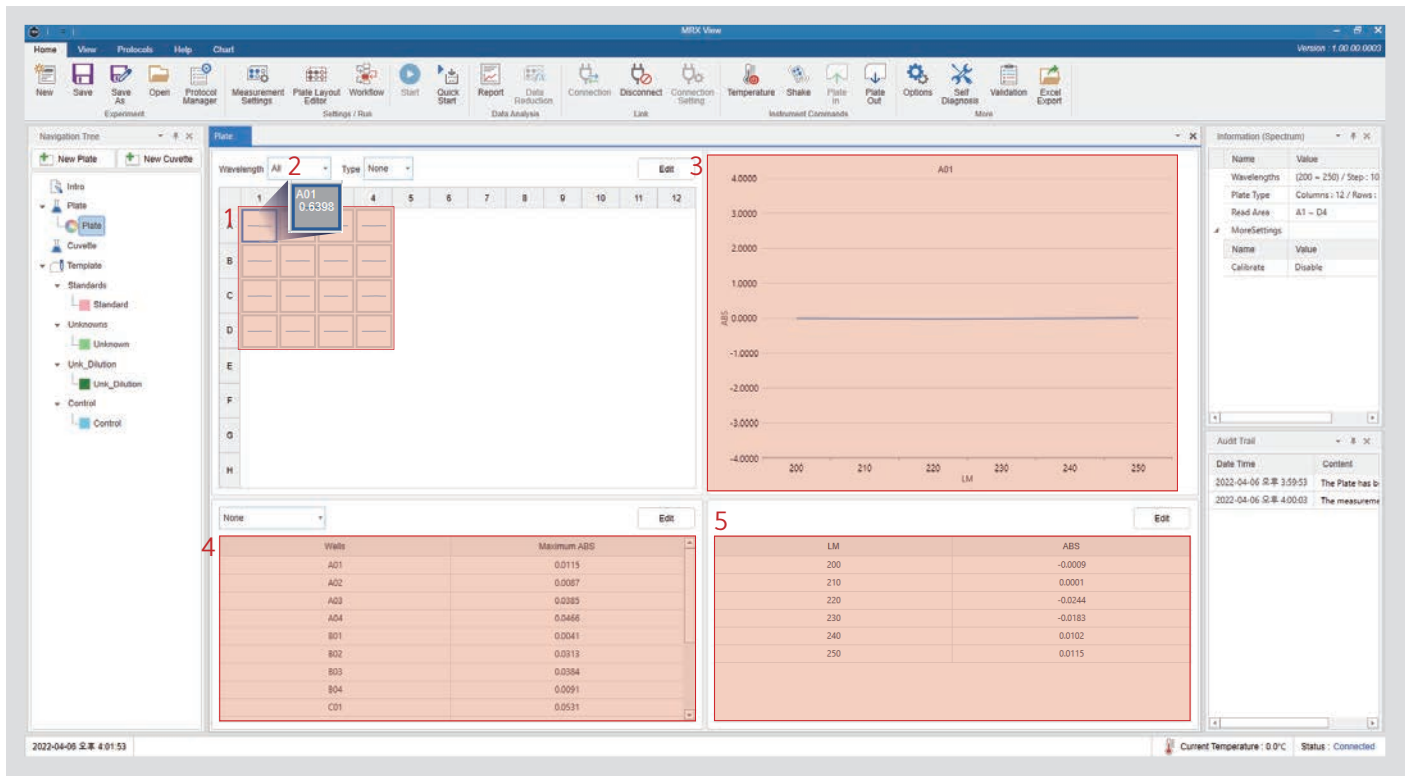
Nonlinear: You can select this option when the concentration of the selected standard is 4 or more.

Nonlinear option (4-5): You can select this option when the concentration of the selected standard is 4 or more.

ex) You can select this option when the concentration of the selected standard is 5 or more.

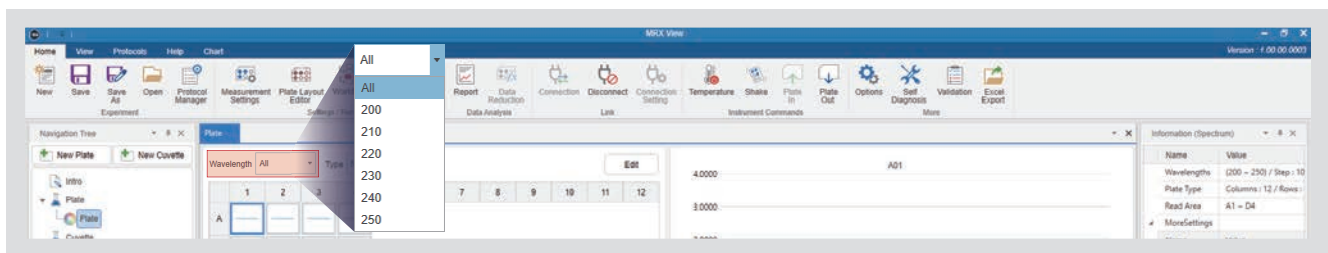
* For more information, see Nonlinear in Chapter 7.3.2 Endpoint standard curve #2, page 40.

7.3.6 Spectrum measurement screen and results



1. Represents a mini-chart for each well of a wavelength.
2. Hover your cursor over a well to see the average absorbance for multi-wavelength measurements.
3. Click the well to view the chart.
4. Indicate the average absorbance per well.
5. Display the absorbance over time for each wavelength of the currently selected well.

Note



You can check the data by wavelength by selecting the wavelength.

* For multi-wavelength, all wavelengths are integrated in full mode to present data on the screen.

7.3.7 Measurement screen and Well Scan results

You can check the data by wavelength by selecting the wavelength.

The screenshot displays the MRX View software interface. The main window is divided into several sections:

- Navigation Tree:** Located on the left, it shows a hierarchy of items including 'Plate', 'Cuvette', 'Standards', 'Unknowns', 'Link_Dilution', and 'Control'.
- Plate Grid:** A 12x12 grid representing a microplate. A blue box highlights well A01, which contains a mini-chart and the value '0.6522'. A red box highlights the entire grid.
- Well Scan Data Table:** A table below the grid showing average absorbance (ABS) for wells A01 through C01.

Wells	Average ABS
A01	-1.3734
A02	-1.4817
A03	-1.3970
A04	-1.3632
B01	-1.2111
B02	-1.3925
B03	-1.3090
B04	-1.2541
C01	-1.0789
- Information (Well Scan) Panel:** Located on the right, it displays details for the selected well (A01), including 'Wavelengths: 500.600', 'Plate Type: Columns: 12 / Rows: 96', 'Read Area: A1 - D4', 'Well Scan: 3 X 3', and 'Path Check: Disable'.

1. It represents a mini-chart for each well of the wavelength.
2. Hover your cursor over a well to see the average absorbance for the Well Scan readings appear in that well.
3. Click a well to view the details of the Well Scan measurement results.
4. Indicate the average absorbance per well.
5. Display the absorbance by Well Scan number of the currently selected well.

Note

The screenshot shows the MRX View software interface with a dropdown menu open for the 'Wavelength' field. The dropdown menu lists three options: '500', '500', and '600'. The '500' option is currently selected. The rest of the interface, including the plate grid and information panel, is visible in the background.

You can check the data by wavelength by selecting the wavelength.

8. Additional features

8.1 Reports

A report will be provided for any measurement data.

The screenshot shows the MRX View software interface with the Report dialog box open. The dialog box is divided into several sections:

- 1**: MRX logo.
- 2**: K LAB information: 34-23, Techno 2-ro, Yuseong-gu, Daejeon, Republic of Korea, Telephone +82-42-932-7556, www.klabkis.com.
- 3**: User Info section with fields for Department (연구1팀), Position (대리), User Name (jsm), and E-mail (smjeong@kswire.com).
- 4**: Experiment Detail section with fields for Plate Name (Plate) and Date Time (2022-04-06 16:10:56).
- 5**: Measure Setting (Endpoint) section with fields for Wavelengths (500.500), Plate Type (Carbore), Columns (12 / Rows (8), Read Area (A1 - C3), Calibrate (Disable), Speed (1), and Path Check (Disable).
- 6**: Chart - Wavelengths : 500(Standard) showing a graph of Absorbance (Abs) vs. Wavelength (nm).
- 7**: Print button.

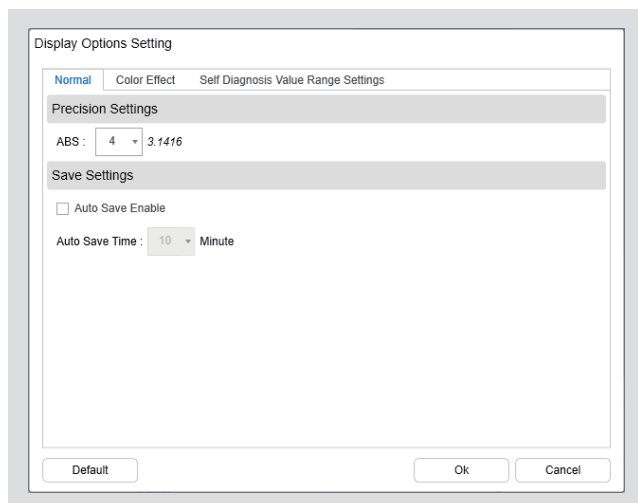
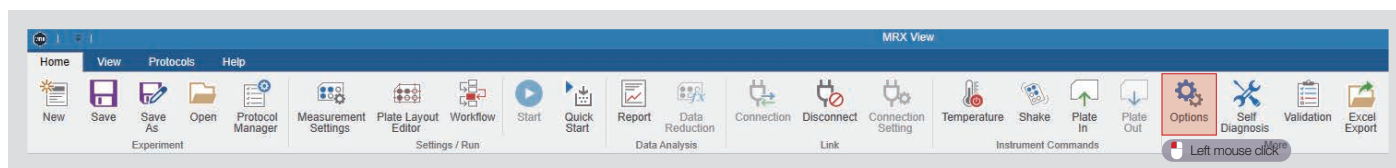
The Report dialog box also includes a list of report items on the right side, which can be checked or unchecked:

- Head
- Logo
- Company Name
- Address
- Homepage
- User Info
- Department
- Position
- User Name
- E-mail
- Experiment Detail
- Plate Name
- Date Time
- Measure Setting (Endpoint)
- Wavelengths
- Plate Type
- Calibrate
- Speed
- Setting Time
- Path Check
- Chart
- StandardCurve
- Chart Data
- Chart Info
- Standard Curve Type
- ZeroCross
- RSG
- Measure Data
- Layout Info
- Area

1. The logo of the designated route is called and displayed.
2. Specify the path for the logo.
3. Decide whether or not the contents of the report will be shown.
4. You can directly edit the header content.
5. User information can be directly edited.
6. You cannot edit any other information within the report.
7. Click "Print" to print the report displayed on the screen.

8.2 Option

Provide other options for the program.

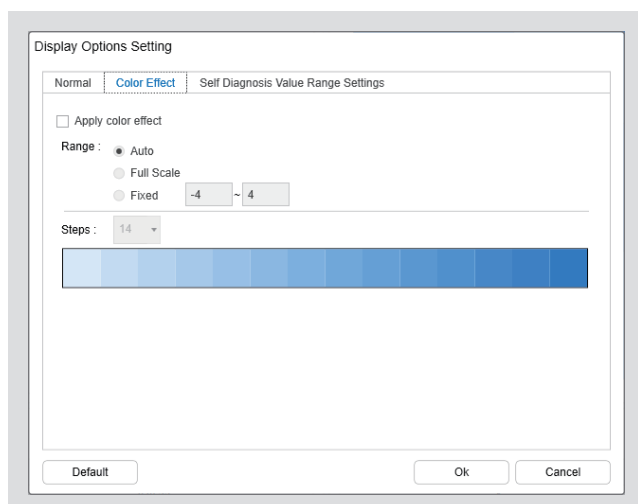


Precision Setting: Sets the number of decimal places for all absorbances shown in the program.

Auto Setting: Enables auto-save and specifies the saving time to automatically save the program at the corresponding time interval.

Note

Auto-save will only work when an experiment has been saved at least once or the path to save the experiment has been specified.

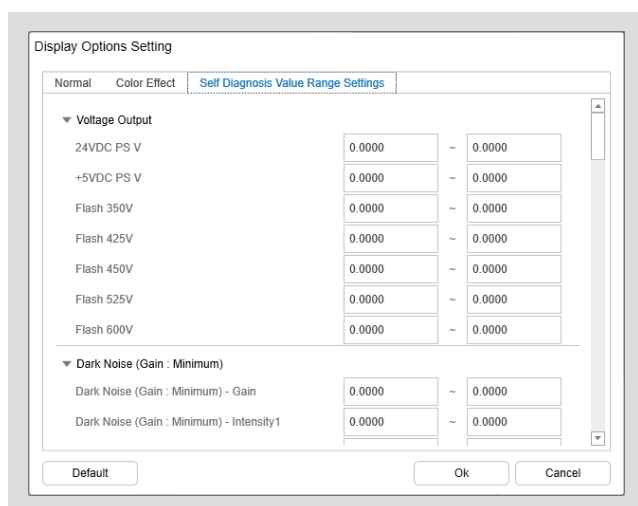


Apply Color Effect: Divides the measured data into the designated step within the specified range and displayed it in color.

Range

- **Auto:** Displays the color by dividing the minimum and maximum values of each wavelength by the designated step.
- **Absorbance Range Value (Minimum - Maximum):** Displays the color by dividing the range between -4 and 4 into the specified step.
- **Fixed Value:** Input a fixed value and divide the range into the designated step to display the color.

Step: Provides the step(s) for Levels 2 to 14.



This option allows the user to specify the criteria for judging whether or not the value of the diagnosed item is normal when performing self-diagnosis.

8.3 Self-diagnosis

This function confirms whether or not the equipment can operate normal.

1. Display whether or not the self-diagnosis list has been completed.

2. Display detailed items and whether or not the self-diagnosis list has been completed.

3. Click "Run" to perform the self-diagnosis.

4. Click "Report" to display the self-diagnosis results on the screen in the form of a report.

8.4 Validation

This function checks the validity of the measurement data.

1. Click "Validate" to display the validation window on the screen.

2. Select the plate.

3. Set the plate details to be validated.

8.4.1 Wavelength accuracy and repeatability

1. Select a wavelength to display the validation progress and results.
2. Display the validation results as a chart.
3. Display the validation results as a data grid.
 - Well: Marks the measurement well.
 - RepeatValue1 to 3: Displays the peak (maximum value) of the 1 to 3 measured values.
 - Accuracy: Indicates the difference between the reference wavelength and the peak value of the first measured value.
 - CriteriaA: Indicates how much accuracy should come from the reference wavelength.
 - JudgementA: Indicates whether accuracy is within the scope of Criteria A.
 - Repeatability: Indicates the standard deviation of the measured value repeated three times.
 - CriteriaR: Indicates how far the repeatability must fall from the reference wavelength.
 - JudgementR: Indicates whether repeatability is within the range of Criteria R.
4. Spectrum: Sets the wavelength interval of the spectrum measurement.
5. Set the reference value used for calculating the moving average.
6. Apply the value calculated from the moving average to the data.
7. Validate the currently selected wavelength.
8. Validate all wavelengths.

Note

- Measurement is performed with a spectrum measurement of ± 3 based on each reference wavelength.
- Moving average calculation is a function that equalizes the values when the chart is not uniform. The higher the reference value, the more uniform the chart becomes.
- The peak may change as the chart becomes uniform.

8.4.2 Photometric accuracy and repeatability (Vis, UV)

Validation

Plate details | Wavelength Accuracy And Repeatability | **Photometric Accuracy And Repeatability (Vis)** | Photometric Accuracy And Repeatability (UV)

1 440 nm | C4 ~ H4 (2.0 A) | C6 ~ H6 (1.5 A) | C8 ~ H8 (1.0 A) | C10 ~ H10 (0.5 A)

465 nm

546 nm

590 nm

635 nm

Standard : 2.1717

ABS

Wells

3

Well	RepeatValue1	RepeatValue2	RepeatValue3	Accuracy	CriteriaA	JudgementA	Repeatability	CriteriaR	JudgementR

4 Start

5 All Start

Excel Export

Cancel

1. Select a wavelength to display validation progress and results.
2. Display the validation results as a chart.
3. Display the validation results as a data grid.
4. Validate the currently selected wavelength.
5. Validate the entire wavelength.

i Note

Photometric accuracy can only be measured with the reference wavelength. Four measurement taps will be provided per well.

8.5 Export data to Excel

This function exports measurement data to Excel.

The screenshot shows the MRX View software interface. The 'Excel Export' button is highlighted in the top toolbar. The main window displays a data table for Wavelength 500, a graph of the standard curve, and an Excel spreadsheet with the exported data.

Wavelength	1	2	3	4	5	6	7	8	9	10	11	12
A	-0.1517	0.0139	-0.6299									
B	0.1371	-0.4231	-0.3219									
C	-0.1841	0.1798	0.2548									

The Excel spreadsheet shows the following data:

Curve Name	Curve Formula	Parameter	Value	Std. Error	95% CI min	95% CI max
StdCurve	$Y=(C \times X^2)+B+A$	C	0.7788	0.0812	1.1559	0.0216
		B	0.8135	0.0558	0.1045	1.5224
		C	-0.1814	0.0110	-0.3210	-0.0419

8.6 Measurement Information and audit history

The screenshot shows the MRX View software interface. The main window displays a data table for Wavelength 400, a graph of the standard curve, and an audit trail table.

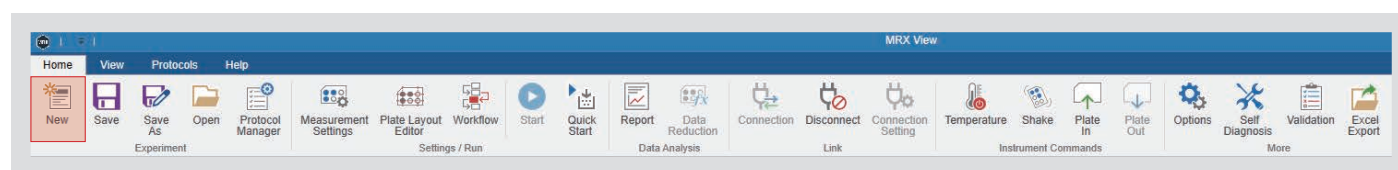
Wavelength	1	2	3	4	5	6	7	8	9	10	11	12
A	0.0554	0.0549	0.0406	0.0511								
B	0.0538	0.0624	0.0579	0.0628								
C	0.0567	0.0556	0.0635	0.0556								
D	0.0539	0.0563	0.1134	0.0560								

The audit trail table shows the following data:

Date Time	Content
2022-04-04 10:32:27	The connectio
2022-04-04 10:32:54	The Plate has
2022-04-04 10:32:57	The measur

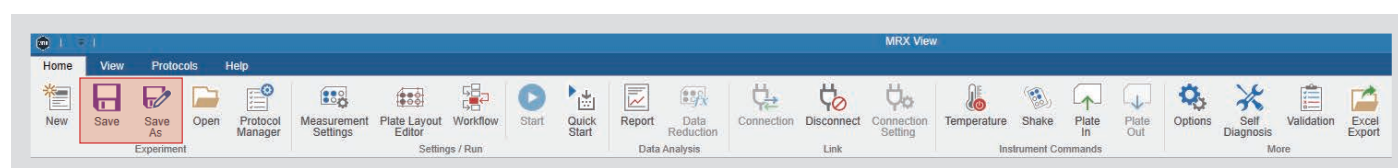
1. The measurement information set by the user is displayed on the right side of the program.
2. Main events that occur while using the program are displayed on the right side.

8.7 New experiment



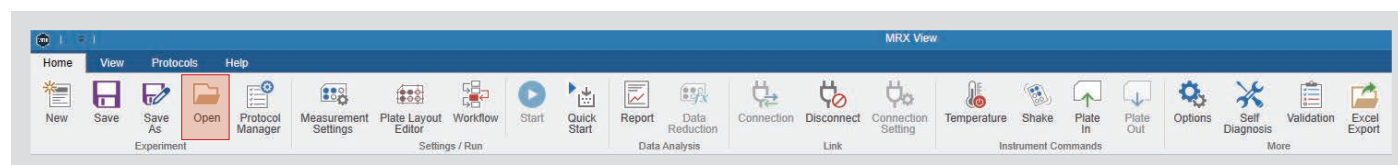
- Click “New Experiment” to initialize the experiment.
- If data is found in the existing experiment, a notification will be displayed that will ask if you want to save before initializing the experiment.
- Initialization will be performed without a separate notification if there is no data for the existing experiment.

8.8 Save and Save As



- Activate “Save” when creating a new plate or editing saved data. (The button will be disabled after saving.)
- “Save As” is always enabled. Use this option when you want to save a file with a different name than the one that was previously saved.

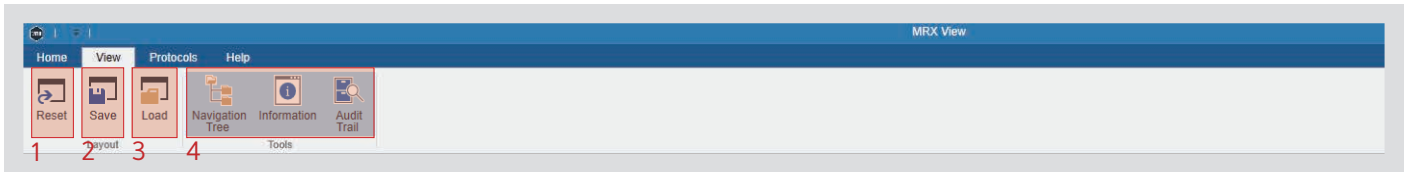
8.9 Open



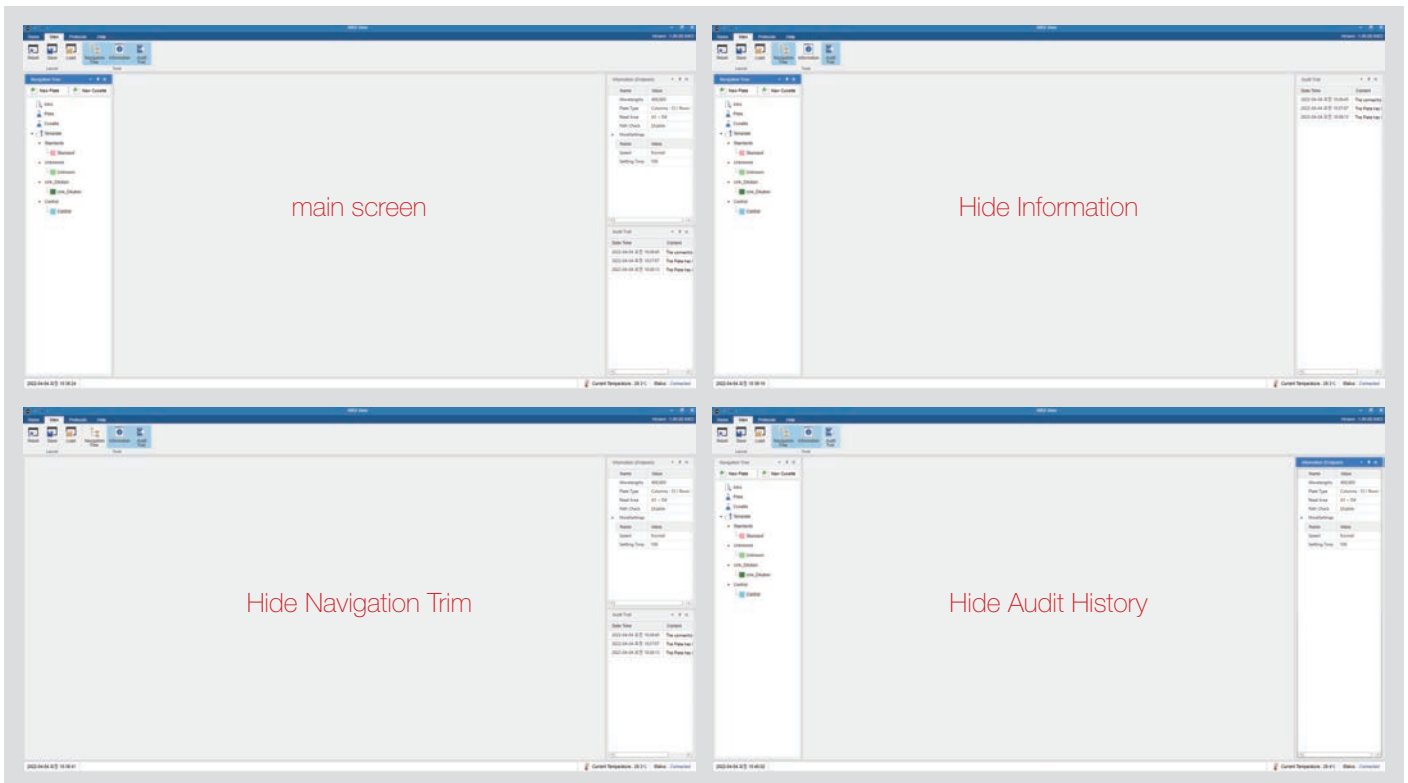
- Click “Open” to load a previously saved experiment.
- A notification will prompt you to save the existing data if you are experimenting with previously measured data.

9. Tab screen description

9.1 View



1. Return the screen configuration to its default state.
2. Save the current screen configuration as a separate file.
3. Load the saved screen configuration.
4. You can hide or show the navigation tree, information, and audit trails on the main screen.

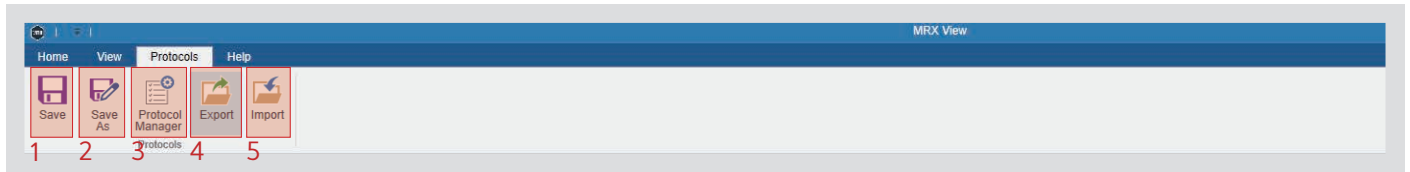


i Note

- Screen compositions will automatically save when the program ends normally; there is no need to save them separately.
- Saved screen compositions will automatically load when the program starts.
- The layout save and load functions are meant to create multiple separate user layouts. Desired layouts may differ for each person using the same program, so these functions allow users to call and use a specific layout.

9.2 Protocol

If there is measurement data, it is a function to export the data to an Excel file.



1. Save

- “Save” will be activated if a mode was created in the experiment.
- A separate pop-up window will appear when you click “Save.” The protocol will be saved in the designated folder when you enter a name and click “Confirm” and “Save.”
- “Save” will be disabled when the save process is complete.

2. Save As

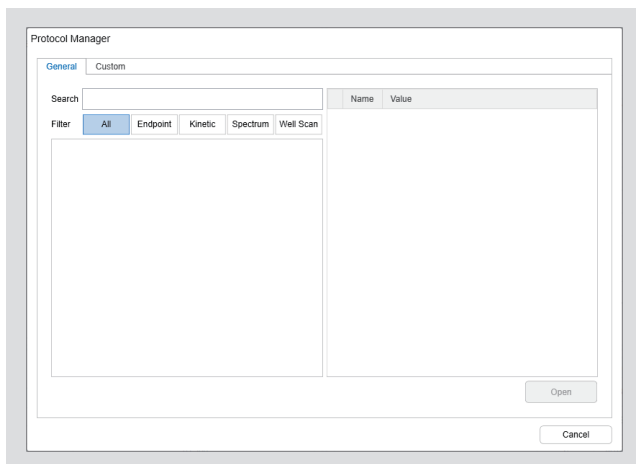
- “Save As” will be activated if a mode was created in the experiment.
- A separate pop-up window will appear when you click “Save As.” The protocol will be saved in the designated folder when you enter a name and click “Confirm” and “Save As.”

3. Protocol Manager. (Refer to [Notes] below)

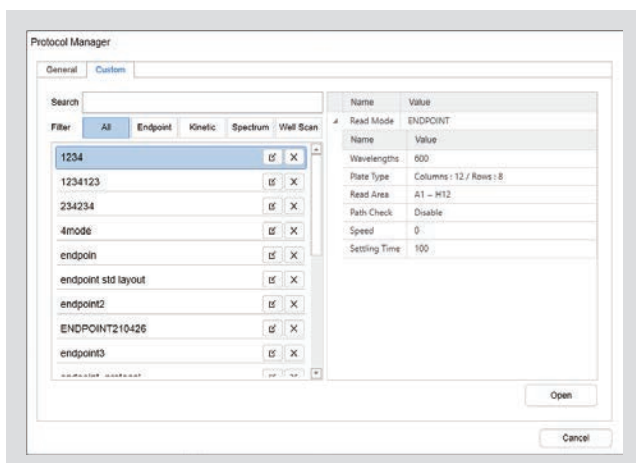
4. Export the saved user-defined protocol to the specified folder.

5. Import the exported custom protocol into the specified folder.

Note

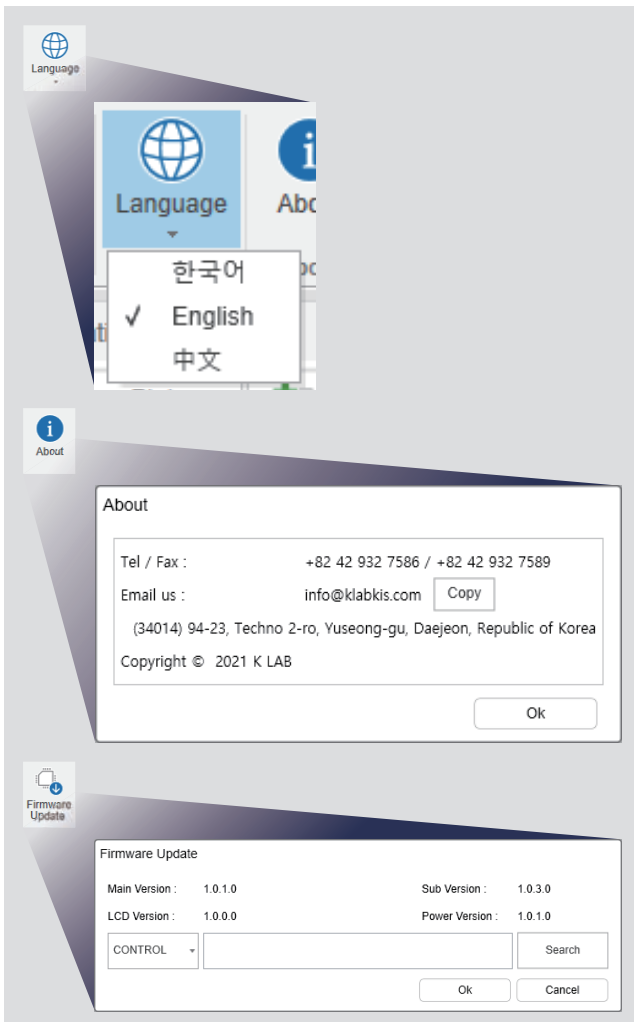
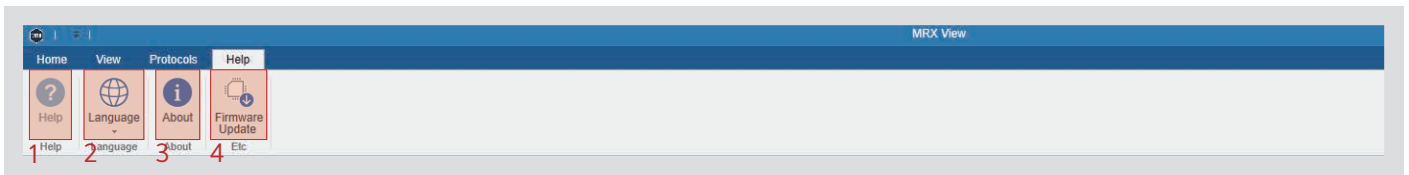


- Provide protocols for specific experiments by default.
- Use “Find” and “Filter” to browse protocols.
- The provided mode and its set values will be shown on the right when a protocol has been selected.



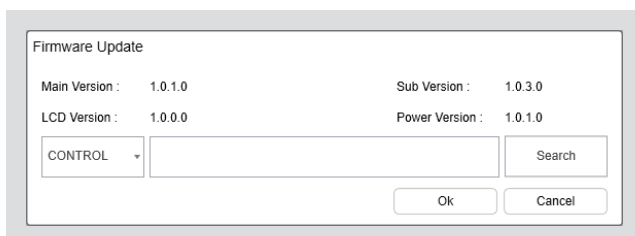
- Provides a list of protocols saved as user-defined.
- You can search for protocols through find and filter.
- If you select a protocol, the mode provided by the protocol and the setting values for the mode is displayed on the right.

9.3 Help



1. Click “Help” to display a separate help window on the screen.
2. When you click “Change Language,” you will receive a notification that states that the program needs to be restarted. The program will automatically restart when you click “Confirm.”
3. Click “Information” to display the program's basic information on the screen.
4. Click “Firmware Update” to display the firmware update window.
 - * For the firmware update method, refer to [Note].

Note



- Check each firmware version.
- Select the firmware list to update.
- Click “Find” to select the firmware update file path.
- After resetting the device's firmware, the update proceeds to the new version.

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MRX View User Guide
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