CellVoyager (CV7000)
User Guide

High-throughput Cytological Discovery System

Wako Automation

YOKOGAWA

CellVoyager

NIH NCI
September 19-20, 2016

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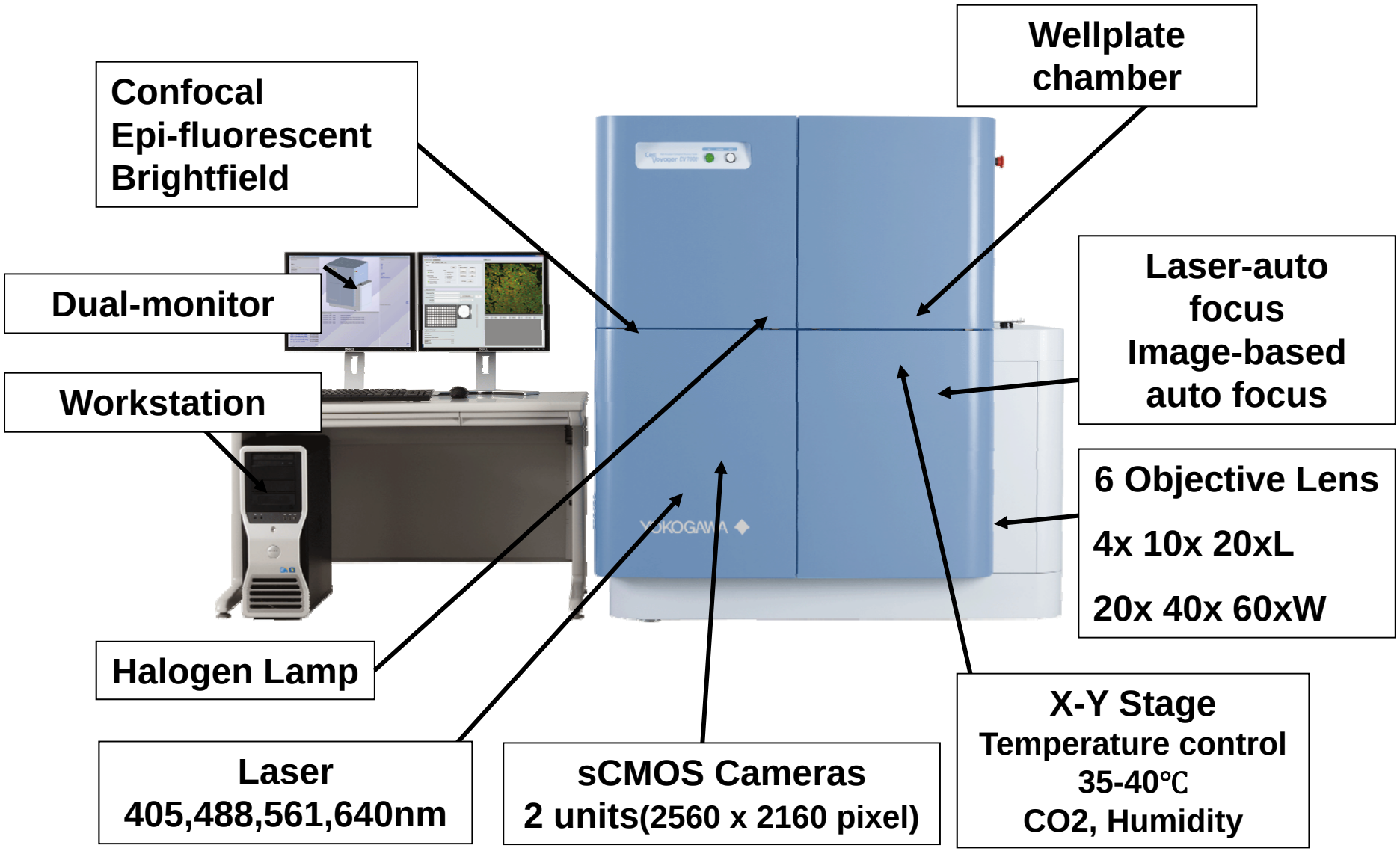
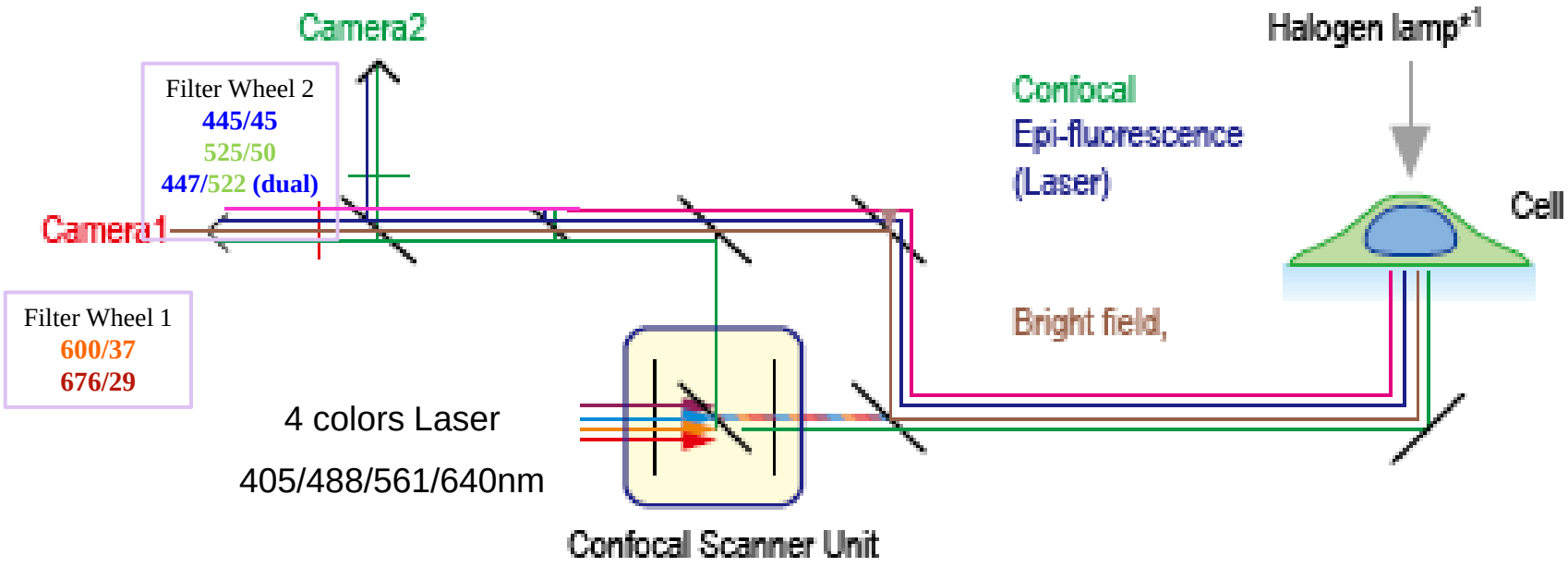
See Instruction Manual for more detailed information.

1.CellVoyager CV7000



1.CellVoyager CV7000

- Filter information



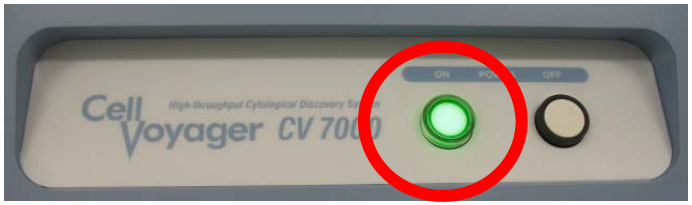
Confocal Fluorescence 405/488/561nm	Confocal image acquisition of 405/488/561nm
Confocal Fluorescence 405/488/640nm	Confocal image acquisition of 405/488/640nm
Epifluorescence 405/488/561/640 nm	Epifluorescence of 405/488/561/640 nm
Bright field	Bright field imaging

2.1 Starting and Shutting down of the CV7000

- Starting the system

1. Turn on the MAIN POWER breaker on the rear side of the equipment.

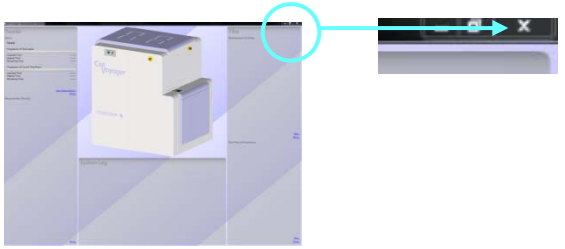
2. Press the POWER ON button on the front side of the equipment.



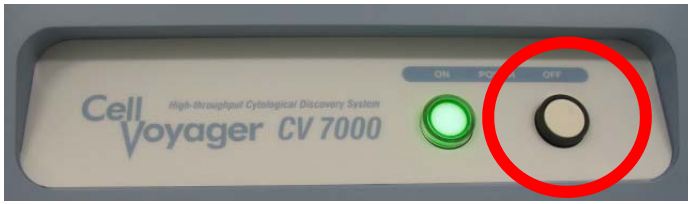
4. Start the Work Station.
5. Start the application software.

- Shutting the system

1. Close the screen of the application software.



2. Turn off the power of the measurement PC.
3. Press the POWER OFF button.

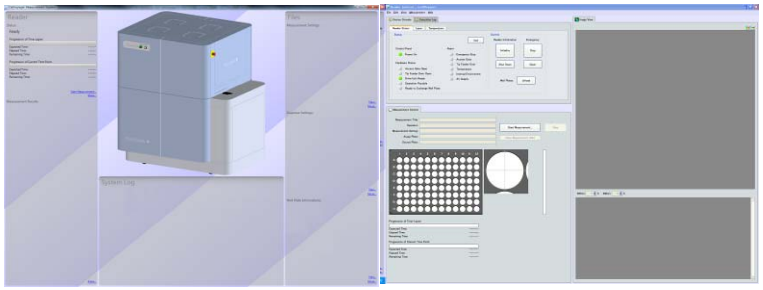


4. Turn off the MAIN POWER breaker on the rear side of the equipment.

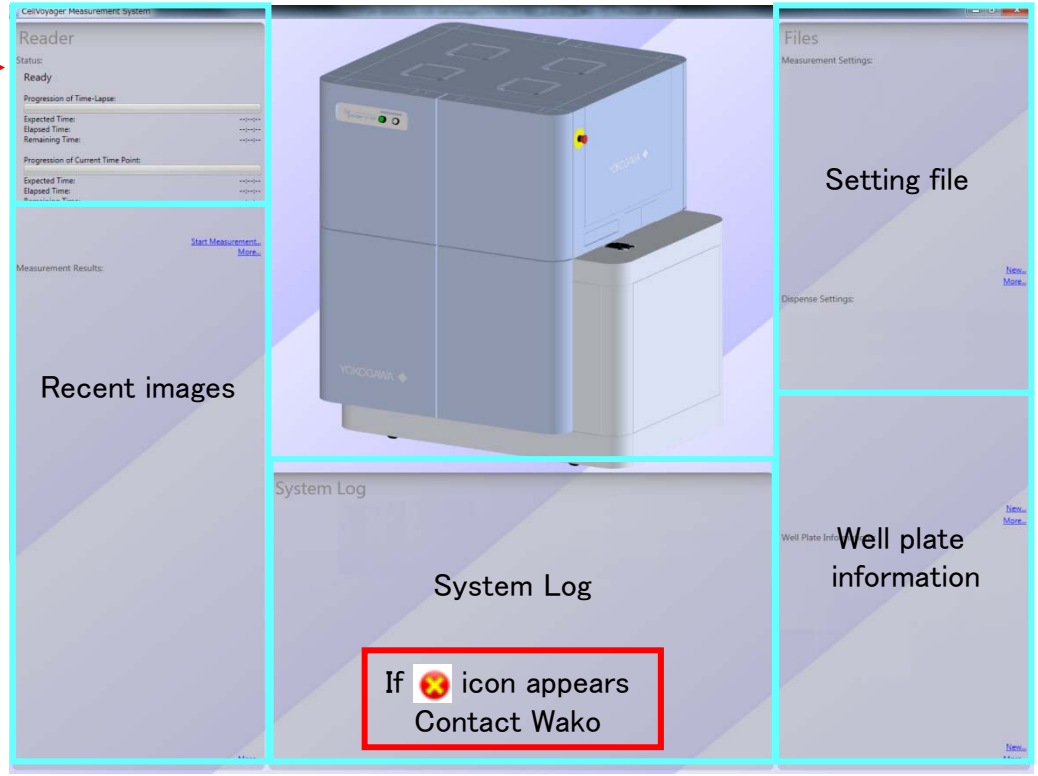
2.1 Main window of the application software

Click the Icon

Control window

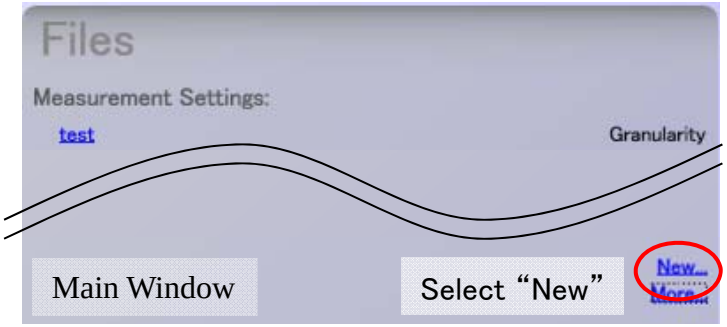


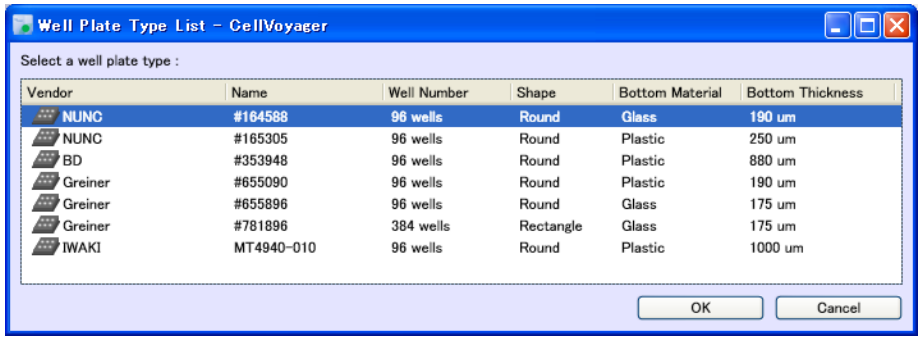
Wait a while till
“Ready” status appears



2.2 Select the Plate and Acquisition setting

- Select Plate





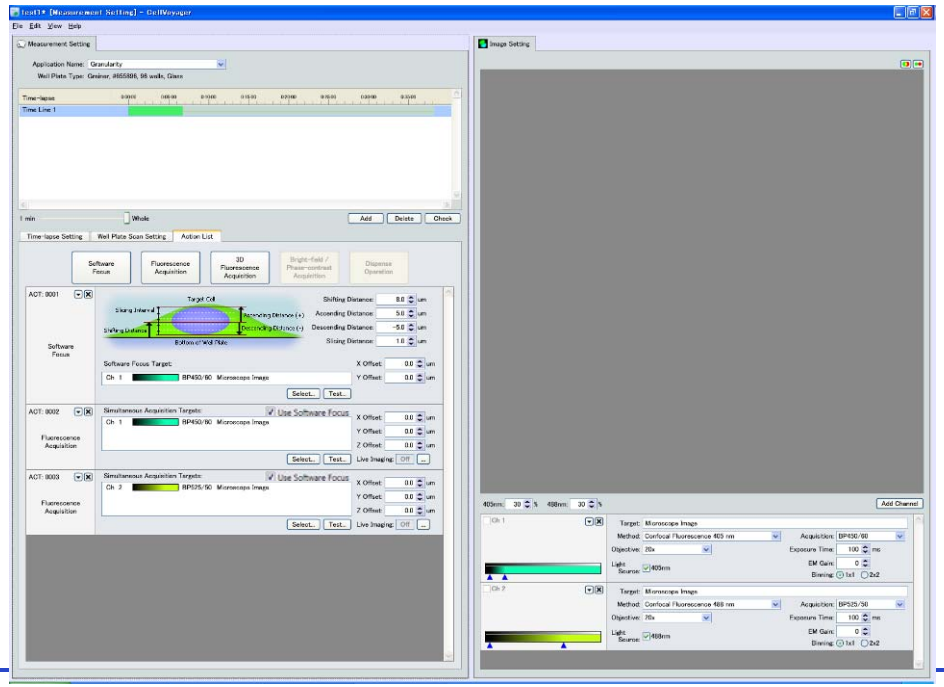
Select plate and Click “OK”

- Setting window of the Acquisition

Time-lapse Setting tab

Well Plate Scan Setting tab

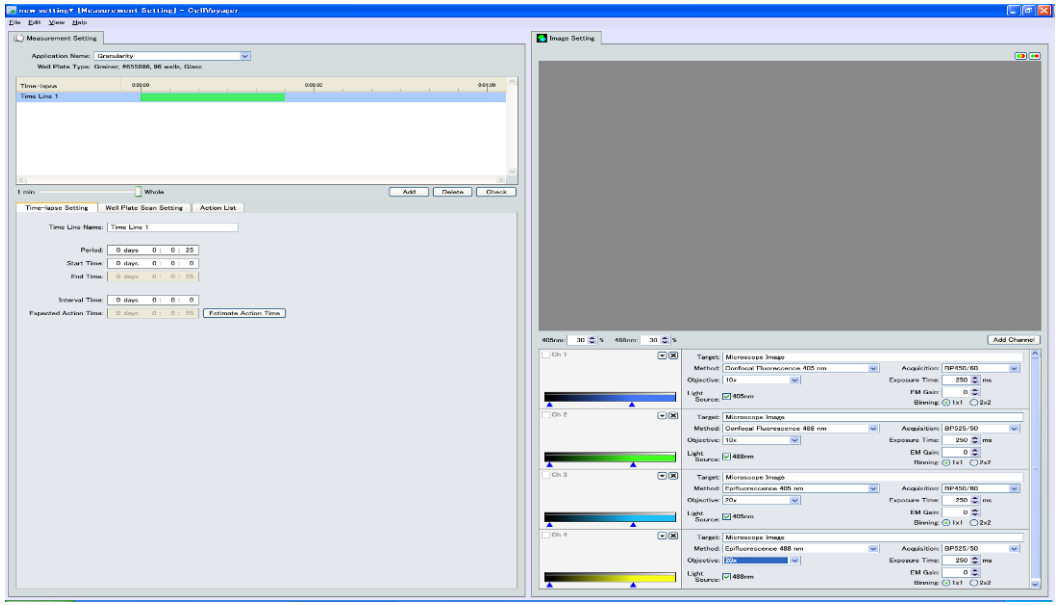
Action List tab



Channel Setting

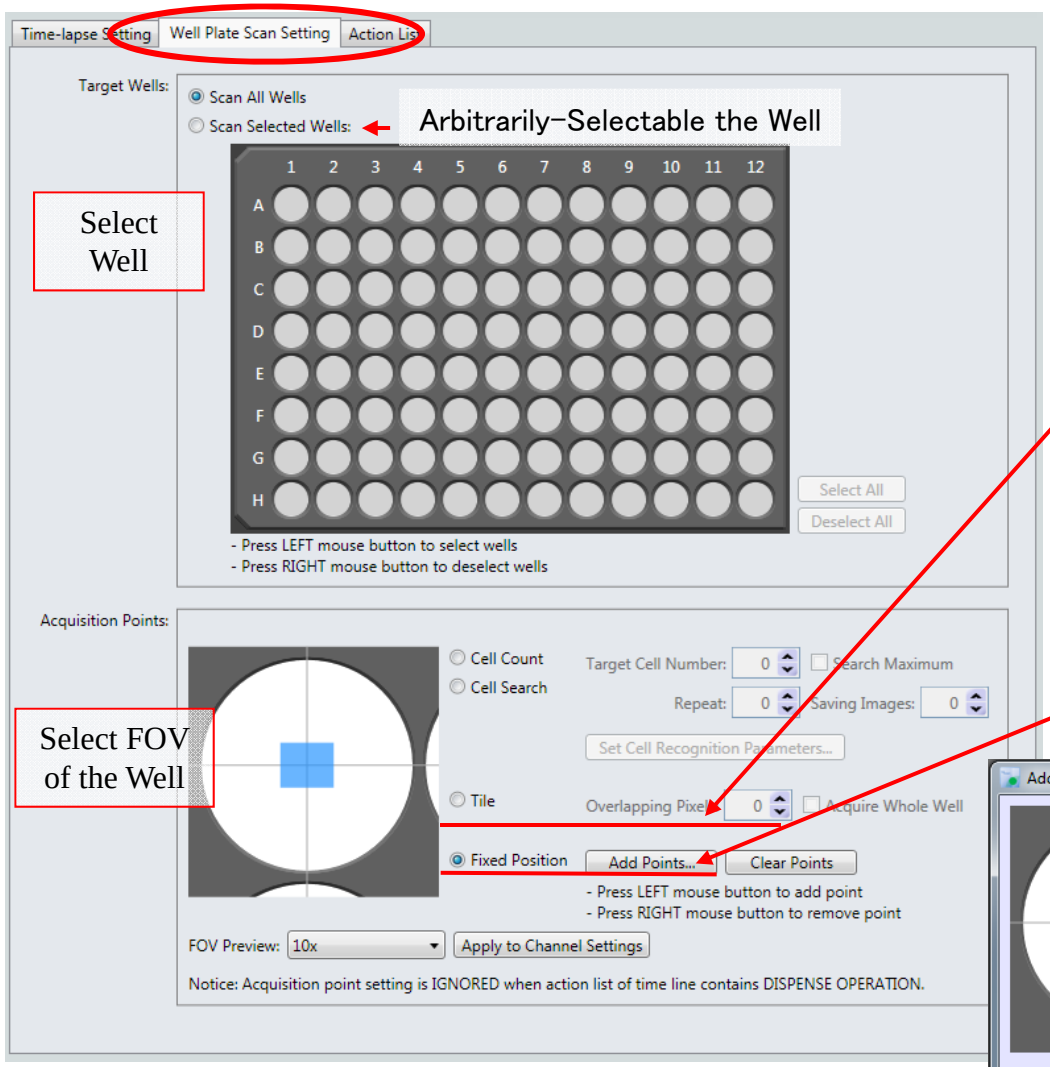
2.3 Setting for Time-lapse Acquisition

- Setting for Time-lapse Acquisition.



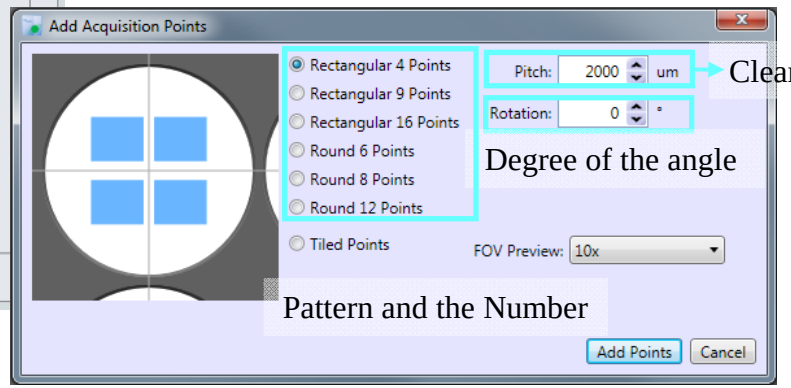
  - No need to set for the single acquisition.

2.4 Set the Acquisition point



Tile acquisition of entire well
(50 is recommended for Overlapping Pixels)

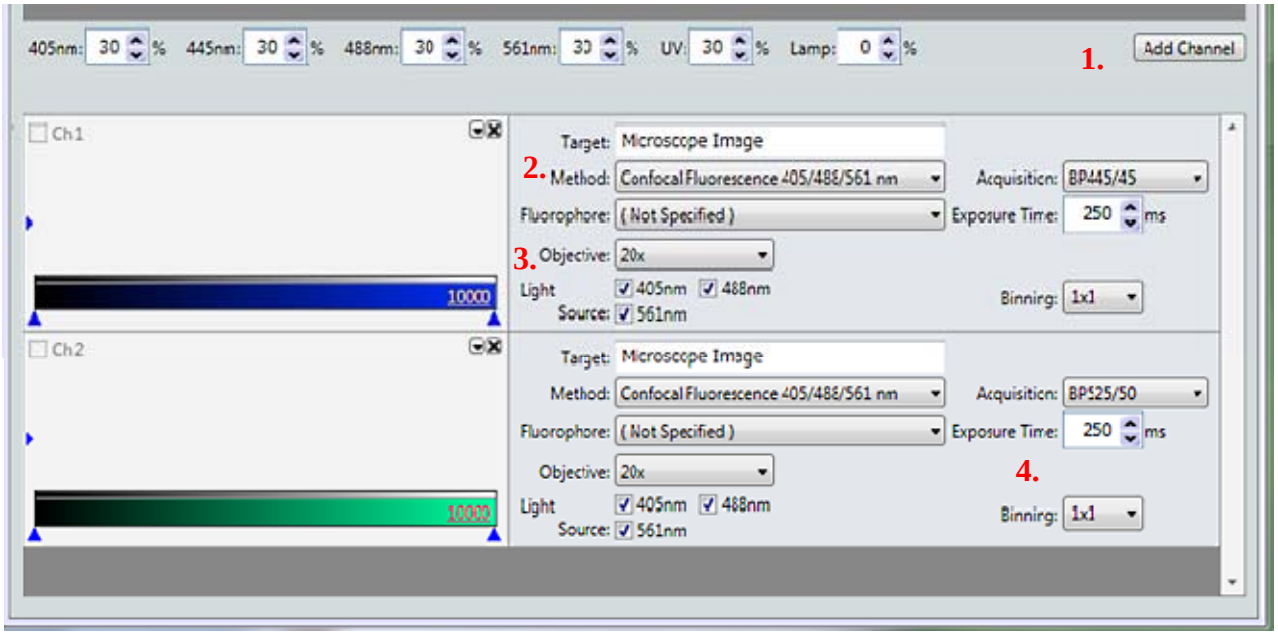
Use this to arbitrarily select the FOV.



2.5 Select the Wave Length and Magnification

1. Create new channel by the "Add Channel" button
2. Select Optical path and wave length by "Method"
3. Select Magnification by "Objective" pull down menu
4. Set "Exposure Time" and "Binning"

Create new Channel



・Method –Combination of the optics–

Confocal Fluorescence 405/488/561nm	Confocal image acquisition of 405/488/561nm
Confocal Fluorescence 405/488/640nm	Confocal image acquisition of 405/488/640nm
Epifluorescence 405/488/561nm	Epifluorescence of 405/488/561nm
Epifluorescence 405/488/640nm	Epifluorescence of 405/488/640nm
Epifluorescence UV Lamp	UV light source
Bright field	Bright field imaging
Digital Phase Contrast	Digital Phase Contrast imaging

・Lens –Objective lens–

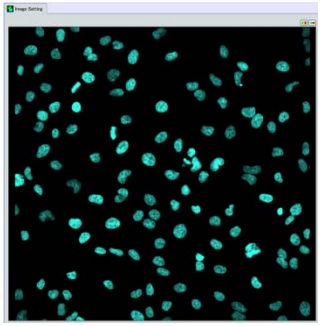
4X	N.A.=0.16
10x	N.A.=0.4
20x	N.A.=0.75
20X LWD	N.A.=0.45
40x	N.A.=0.95
60xW	N.A.=1.2

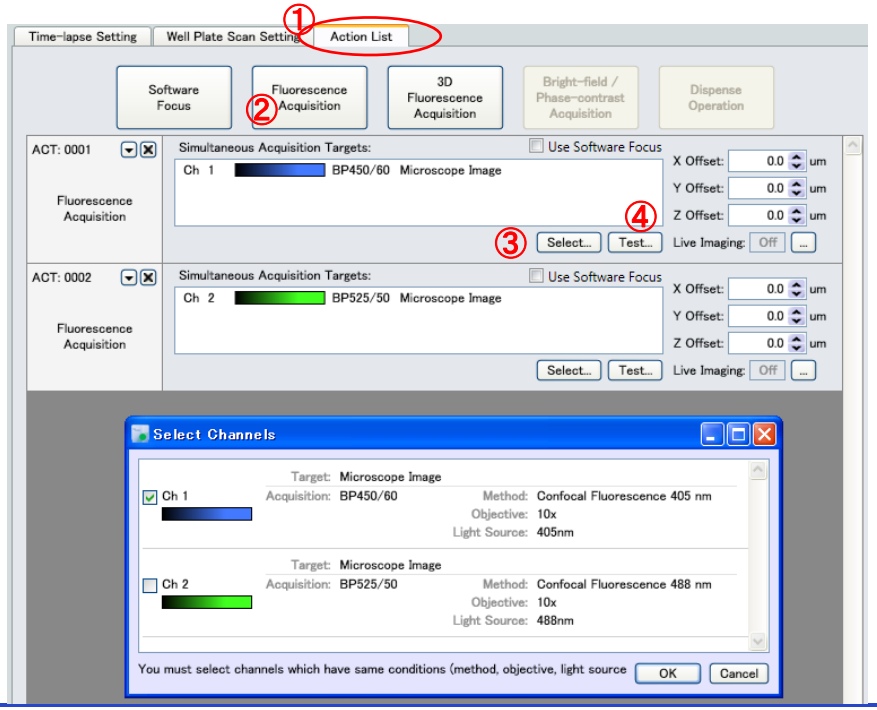
・Exposure Time

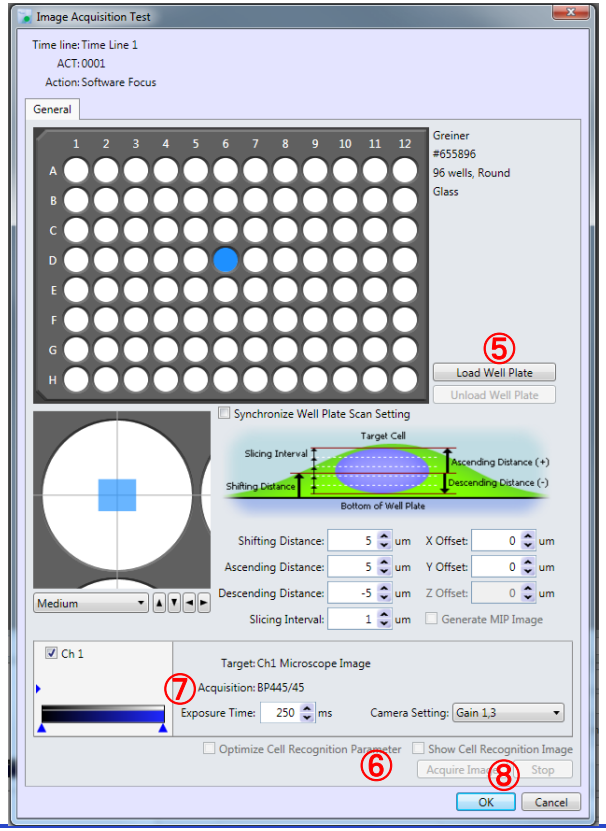
・Binning

2.6 Setting of Acquisition –Single Z Slice Acquisition–

1. Select “Action List” tab
2. Click ”Fluorescence Acquisition” to show setting window
3. Click ”Select” button and select the “Channel”
4. Click ”Test” and show up the “Image Acquisition Test” window
5. Click ”Load Well Plate” and set the Well Plate
6. Click ”Acquire Image” and arrange the Z Offset
7. Arrange the Exposure Time
8. Stop Preview by the ”Stop” button and click ”OK” to close the window.

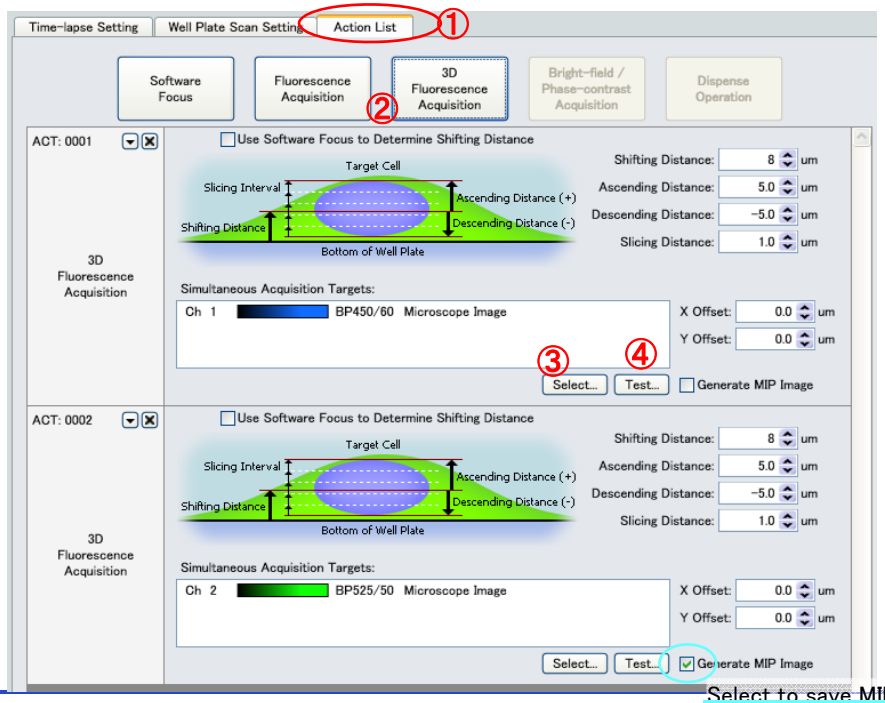


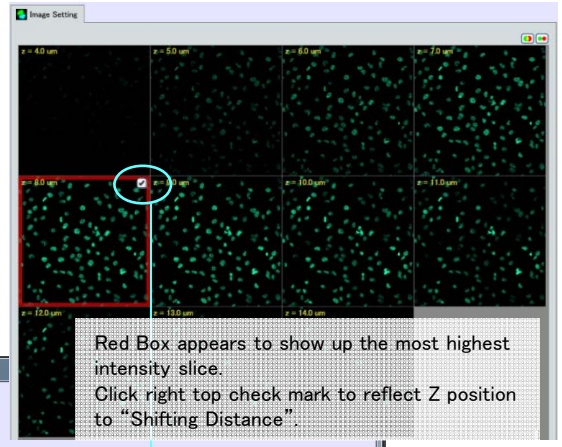


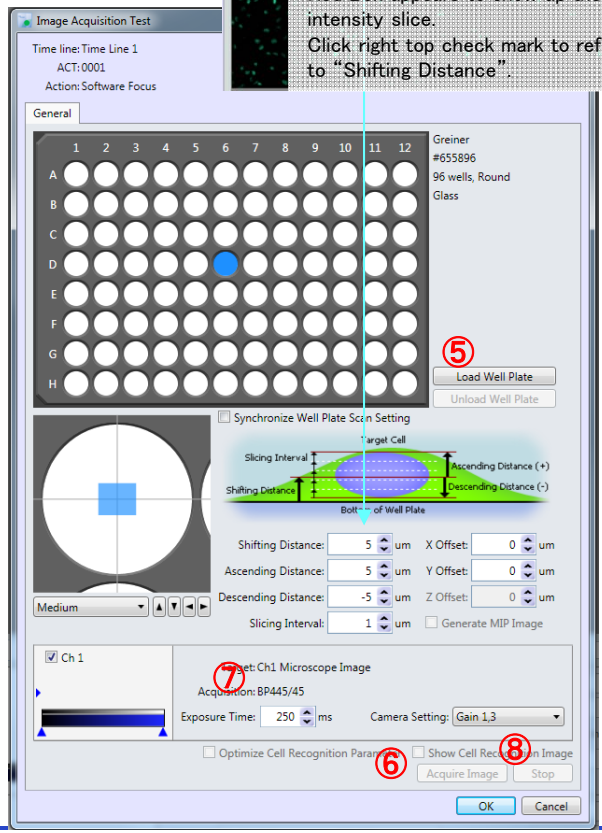


2.7 Setting of Acquisition–3D Acquisition–

1. Select “Action List” tab
2. Click ”3D Fluorescence Acquisition” button to show up setting window
3. Click ”Select” button and select Channel
4. Click ”Test” and show up Image Acquisition Test window
5. Click ”Load Well Plate” and set the plate
6. Click ”Acquire Image” and find the focusing position
7. Adjust exposure time and Binning.
8. Click ”Stop” and click ”OK” to finish the test window.



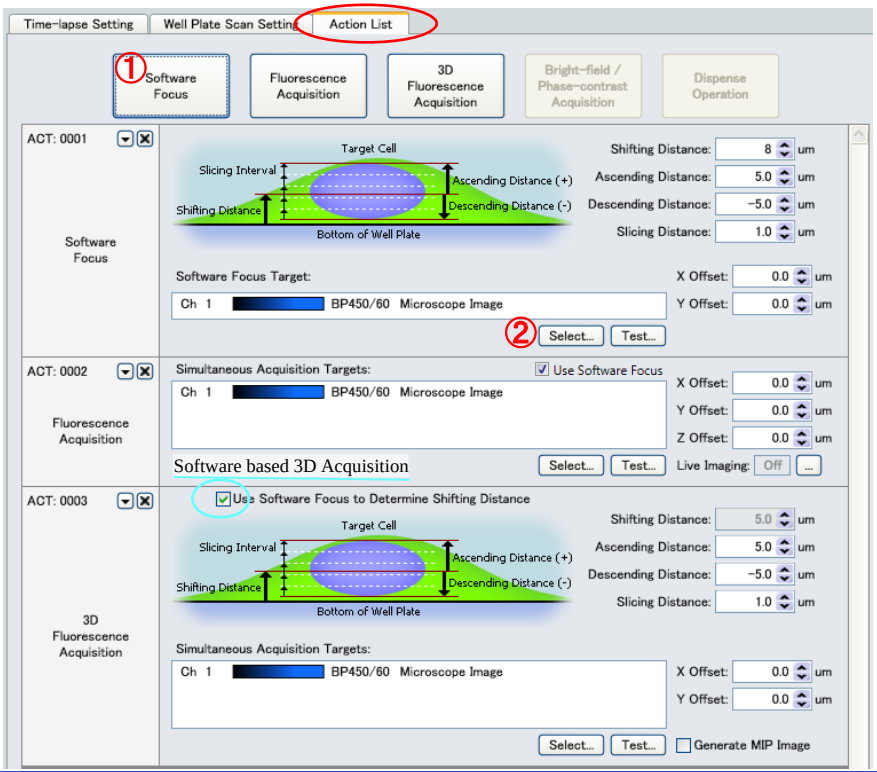


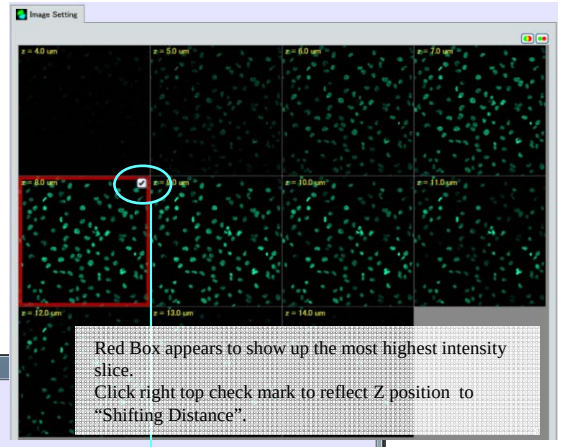


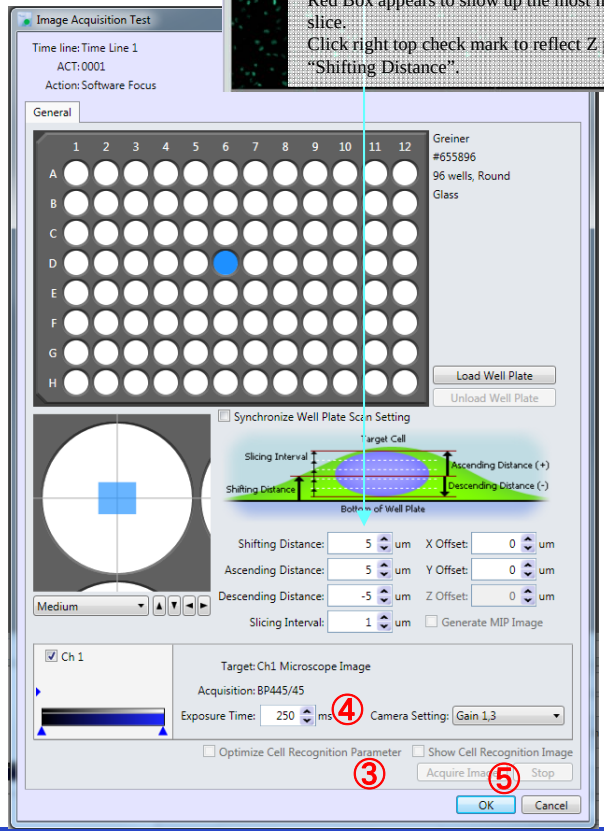
2.8 Setting of Acquisition–Use Software Focus–

Make most brightest Z position to the Standard position.

1. Click “Software Focus” and Select the Wavelength from ”Select”.
2. Click ”Test” and Image Acquisition Test window is appears.
3. Set the plate and click ”Acquire Image” to select the Z position.
4. Select Binning and exposure time.
5. Click ”Stop” and click ”OK” to finish the test window.

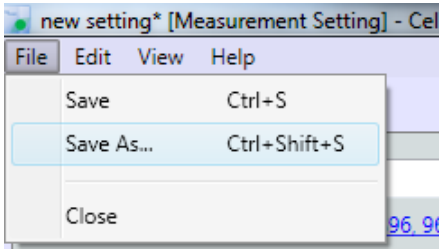




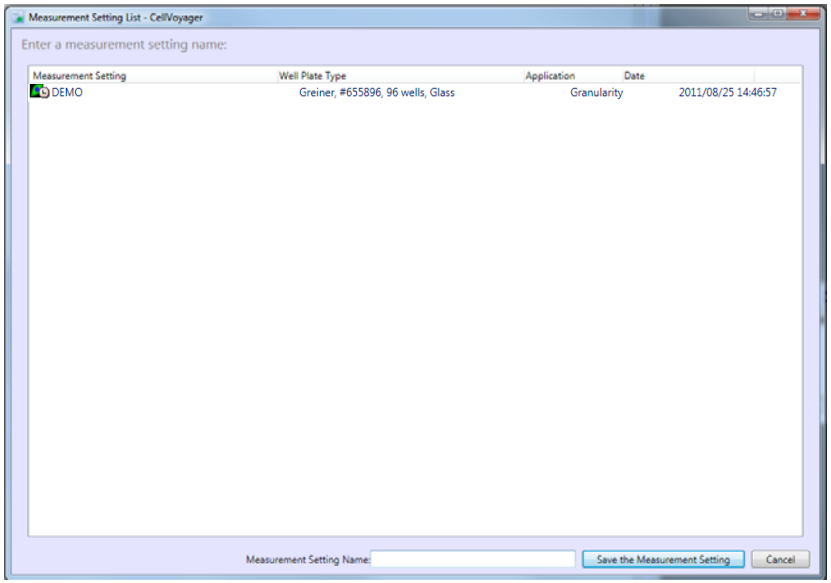


2.9 Save the Acquisition Setting

1. Select ”Save” or “Save As” from ”File”.



2. Enter the ”Measurement Setting Name” then click ”Save the Measurement Setting”

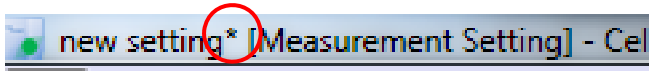


2.10 Start Acquisition

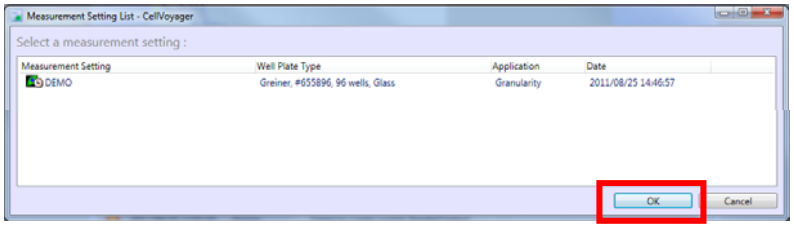
1. Click 

at the right window.

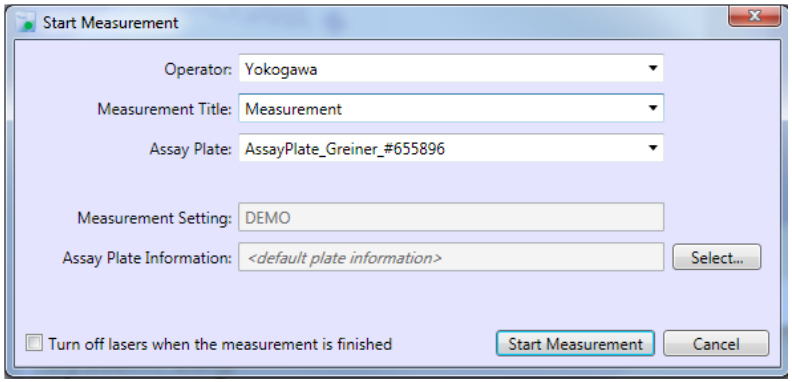
(!) ＊ mark appears when the measurement setting is un-saved.



2. Select Measurement Setting and click ”OK”



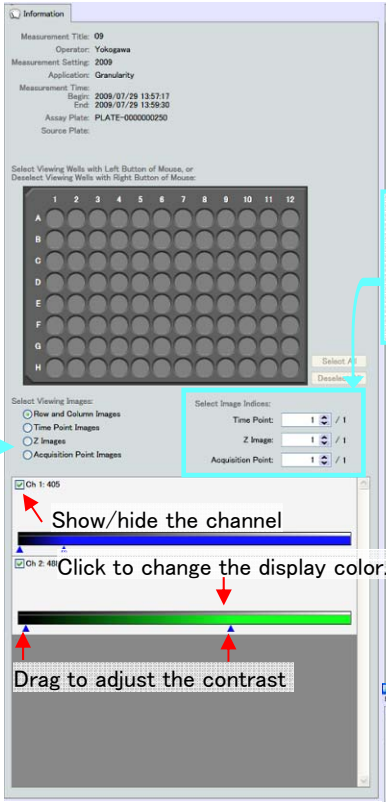
3. Enter ”Measurement Title”, ”Operator” and click ”Start Measurement” to start acquisition.



4. Click “NO” when the plate already loaded at CV7000.

Start Acquisition.

2.11 After Acquisition –View Images–



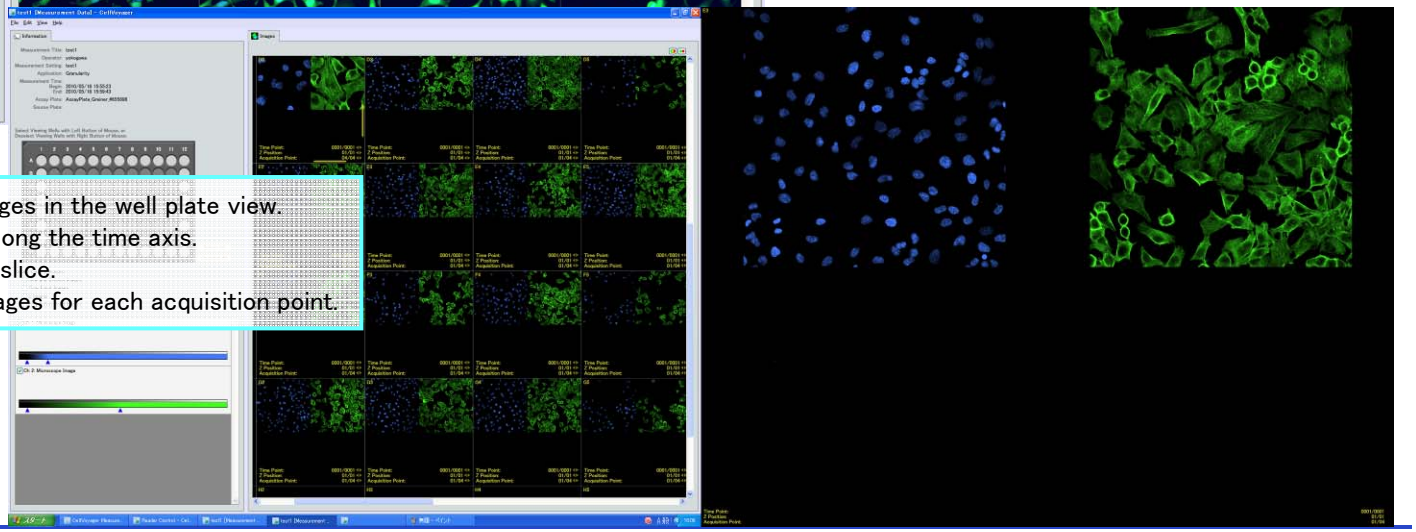
Scroll the mouse wheel to zoom into/out of the image

Change the number of all images displayed on the display area.
(Image number of the image being displayed/total number of iamges)

Select the display format for channel images.
Show overlaid images of multiple channels or select display for channel images.

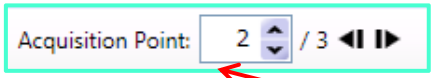
Click the Arrow mark to show the next Time series, Z position or View field.

Row and column Images : Show images in the well plate view.
Time Point Images : Show images along the time axis.
Z Images : Show images for each Z slice.
Acquisition Point Images : Show images for each acquisition point.

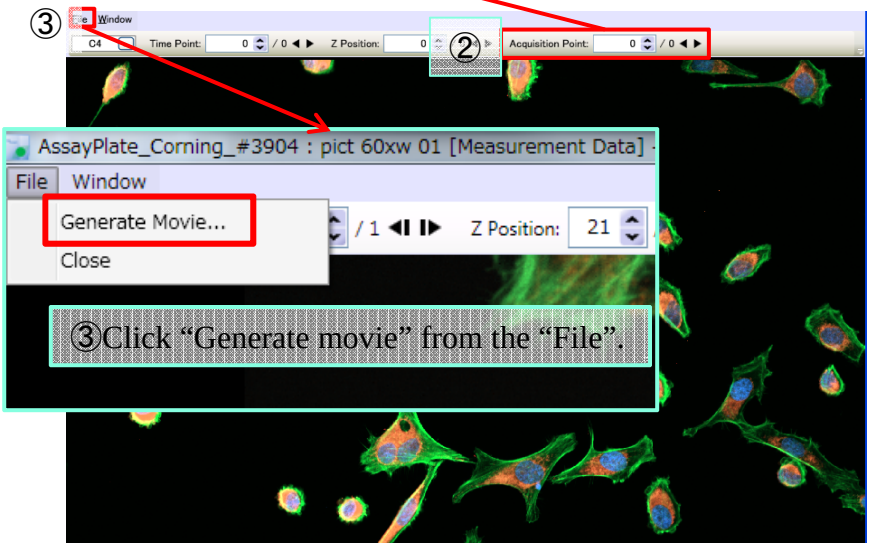


2.12 After Acquisition –Movie output–

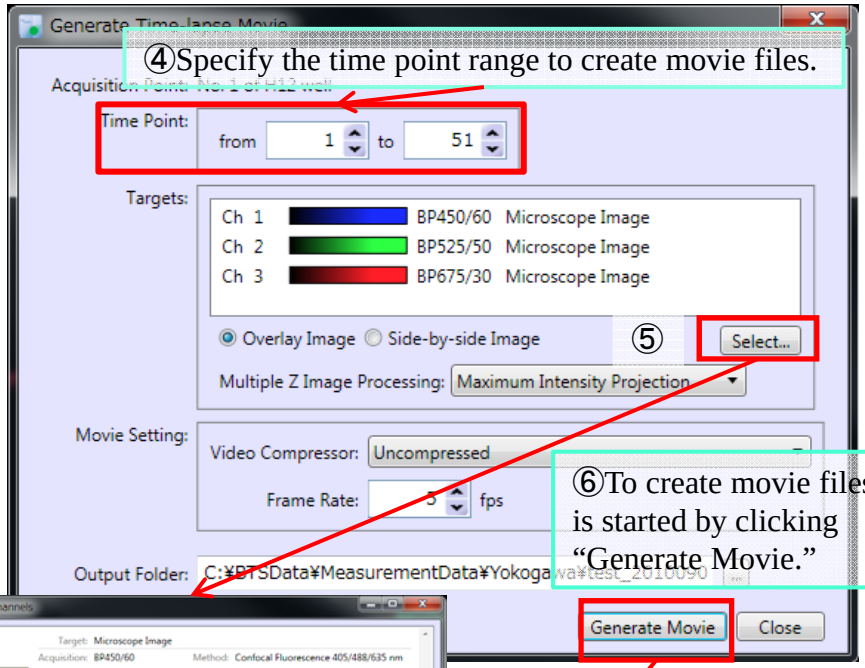
①Click an image to display the sub screen.



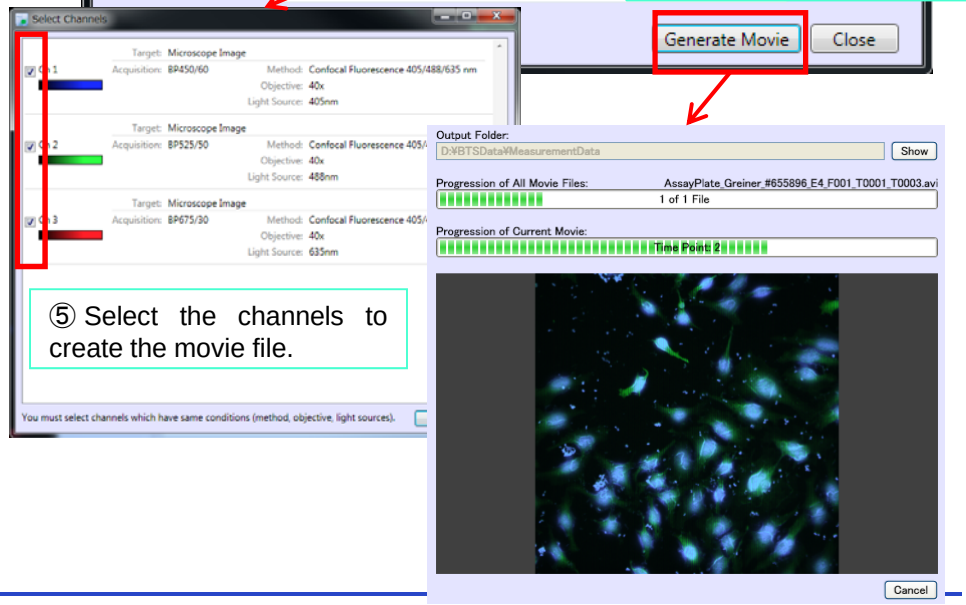
②Select the field to create movie files.



③Click “Generate movie” from the “File”.

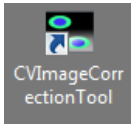


⑥To create movie files is started by clicking “Generate Movie.”

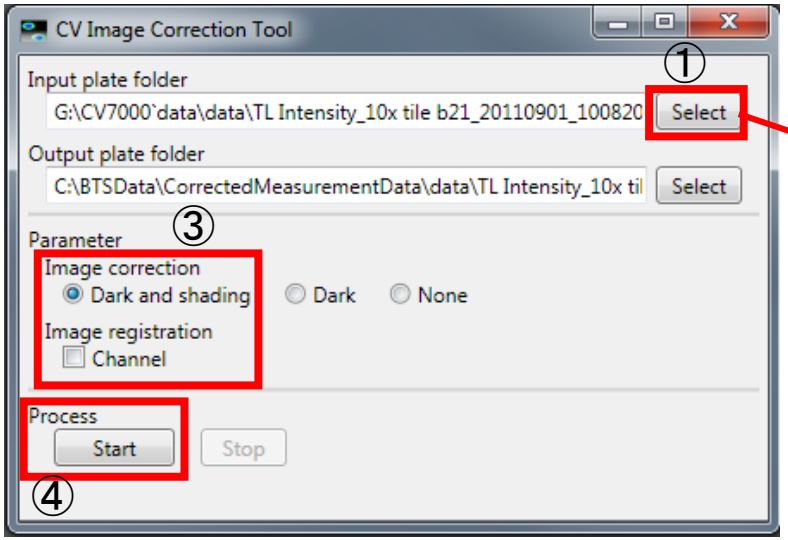


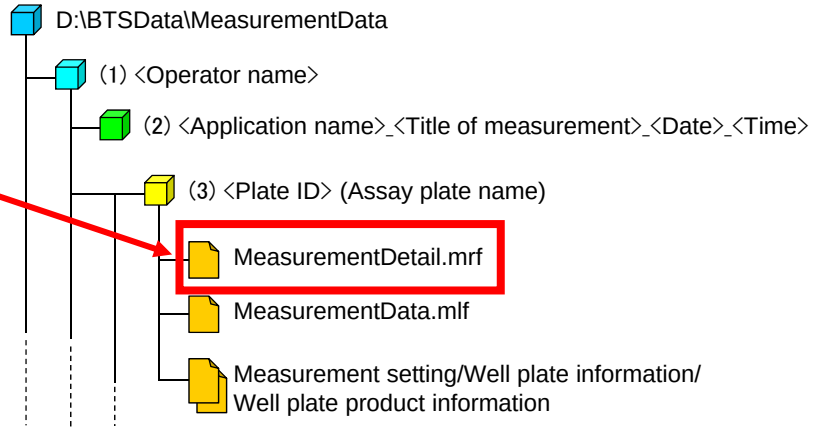
⑤ Select the channels to create the movie file.

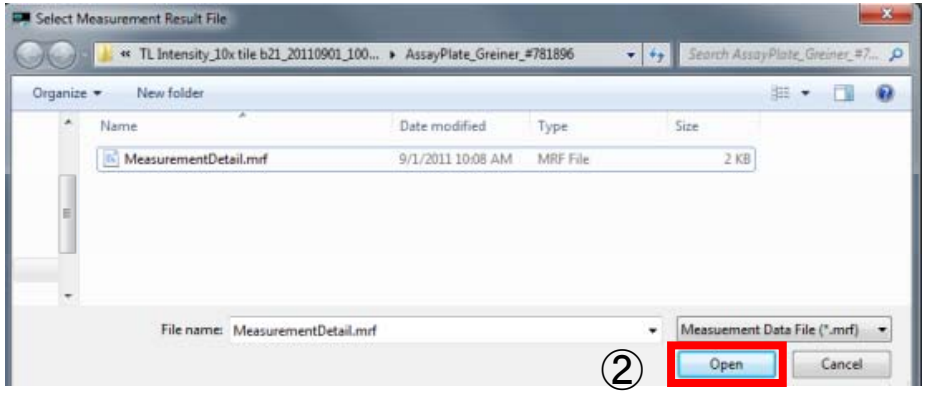
2.13 After Acquisition –Shading and Registration Correction–

1. Click the icon 

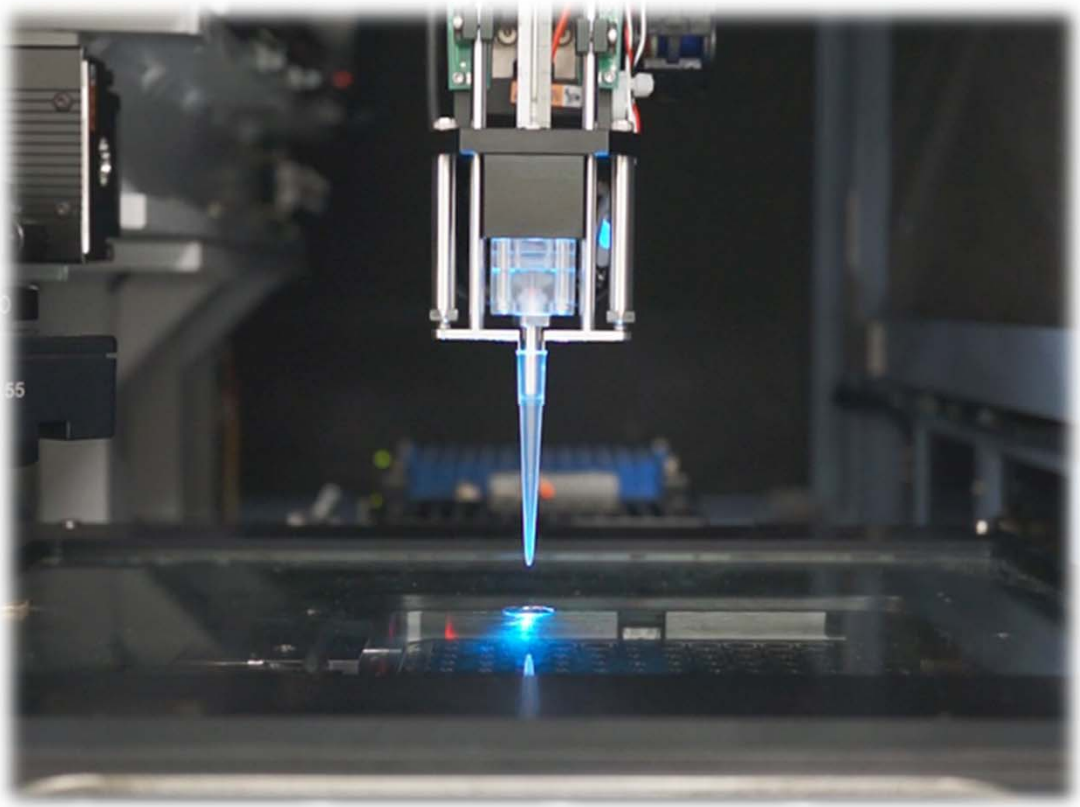
on the desktop of the measurement PC.
2. Select “MeasurementDetail.mrf” file and then click “Open”.
3. Select Output folder. *Default setting of output folder is “BTSData¥CorrecterMeasurementData”.
4. Select “Dark and shading”/”Image registration” from Parameter and click “Start”.







CellVoyager (CV7000)
User Guide
Dispenser



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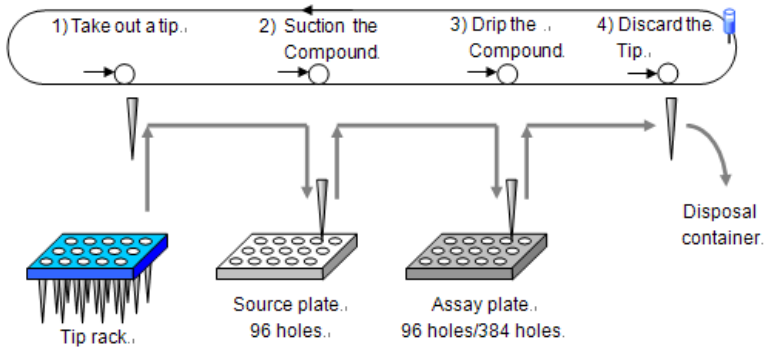
CellVoyager

Table of Content

See Instruction Manual for more detailed information.

1. Dispensing Function

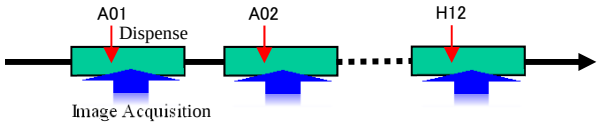
- Over View of Dispensing Mechanism.



- Types of the available Dispensing at CV7000

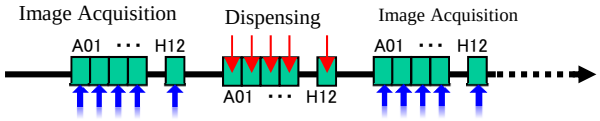
High speed time lapse (Acquire image after the dispensing.)

A01 (Image Acquisition→Dispensing→ Image Acquisition) → A02 (Image Acquisition → Dispensing → Image Acquisition) →→ H12 (Image Acquisition → Dispensing → Image Acquisition)



Time Lapse (Dispense all the well then acquire image)

Image Acquisition (A01→H12) → Dispensing (A01→H12) → Image Acquisition (A01→H12) →

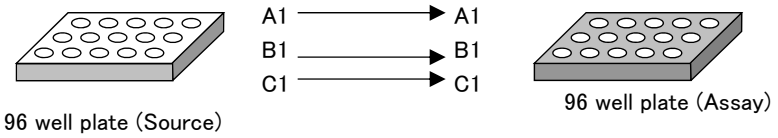


- Dispensing Pattern

The following settings are available.

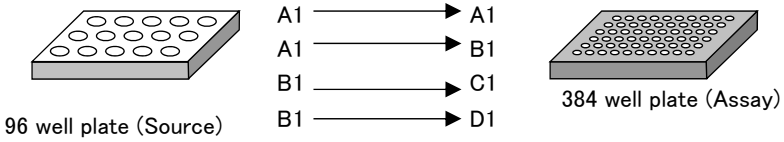
1) 96 well plate (Source) → 96 well plate (Assay)

the simplest pattern where the wells in one plate have a one-to-one association with the wells in the other plate.

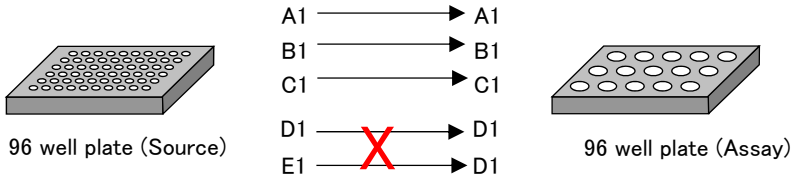


2) 96 well plate (Source) → 384 well plate (Assay)

One well in the source plate is associated with multiple wells in the assay plate.



3) 384 well plate (Source) → 96 well plate (Assay)



Caution) Dispensing from the multiple wells in the source plate to one well in the assay plate cannot be performed.

1. Dispensing Function

- Before using the dispenser…

  - Please make sure the following points.

■Turn on the Environmental control

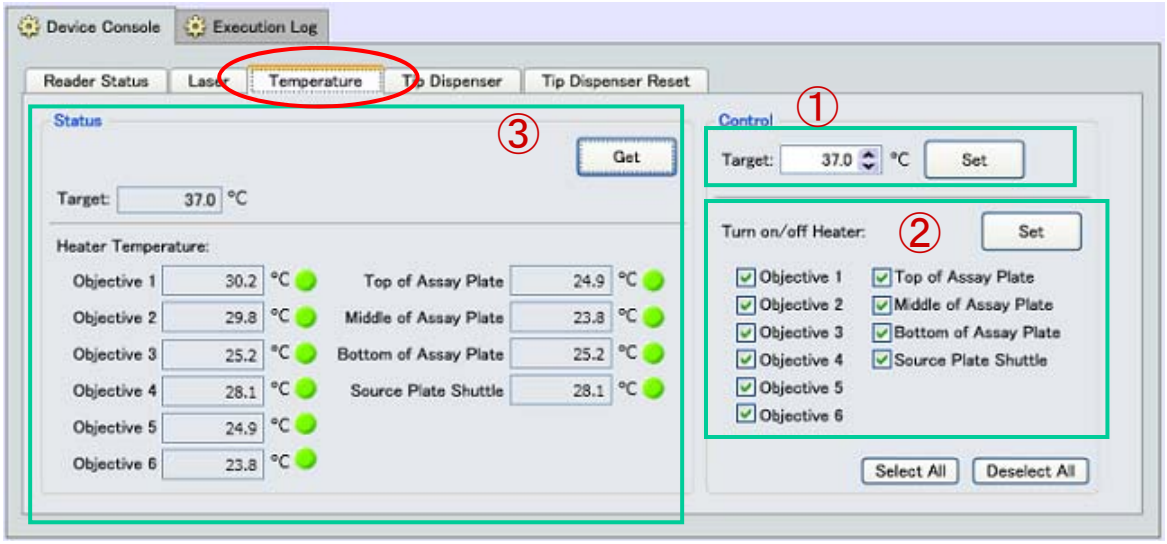
Temperature, CO2, Water

■Uncover the lid of both plates.

It may damage the system

2.1 Temperature control

- Click the “Temperature” tab of Device Console at Recorder Control window. (Right monitor)



① Enter the temperature to be set.

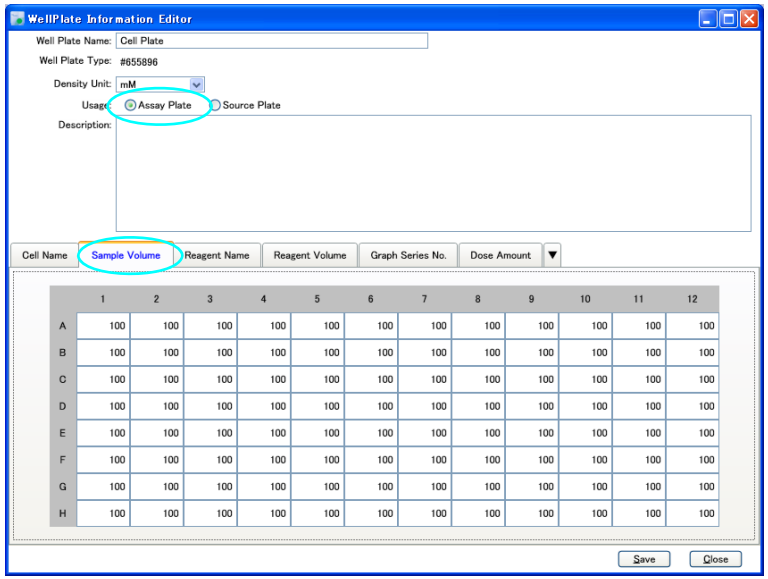
② Select all of the check, and then click ”Set”.

③ Click ”Get” and check the current status information.

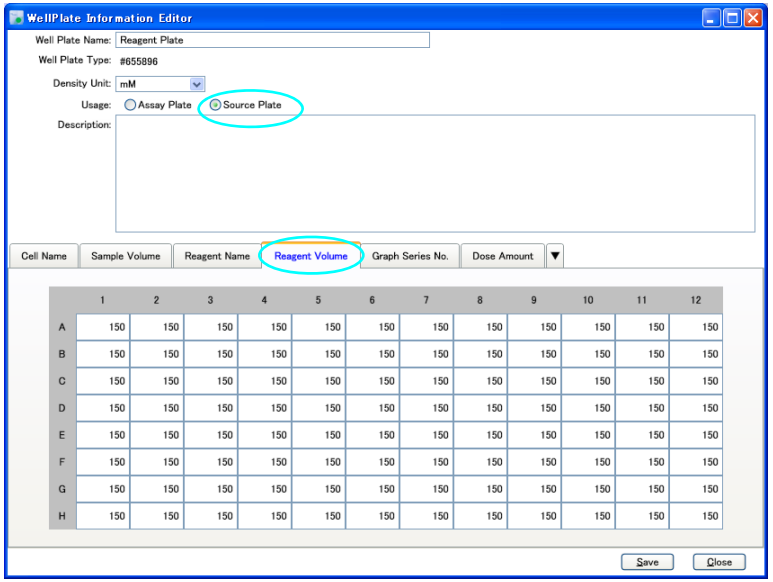
2.2 Well Plate Information

- Click “New” at the bottom of the Well Plate Information area

- Enter the Sample Volume tab at Assay Plate(Cell plate)
  - Enter the volume of the assay plate (e.g.100ul)



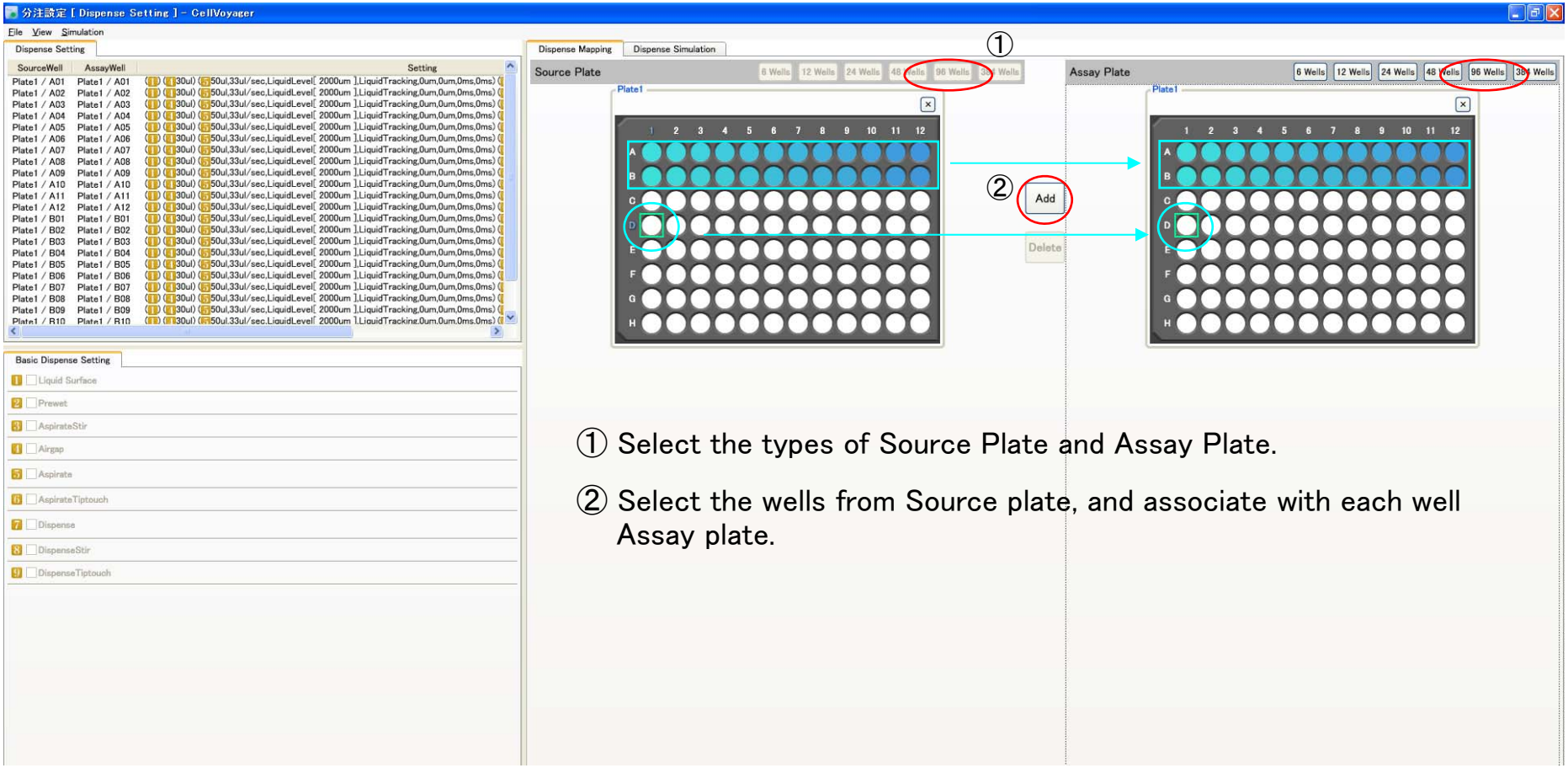
- Enter the Reagent Volume tab at Source Plate(Reagent plate)
  - Enter the volume of the reagent at each well (e.g.200ul)



ATTENTION) Please add 100μl for each reagent volume since dispenser needs 100ul extra volume for safety. Don’t use much more than the working volume of each well plate.

2.3 Dispense Settings

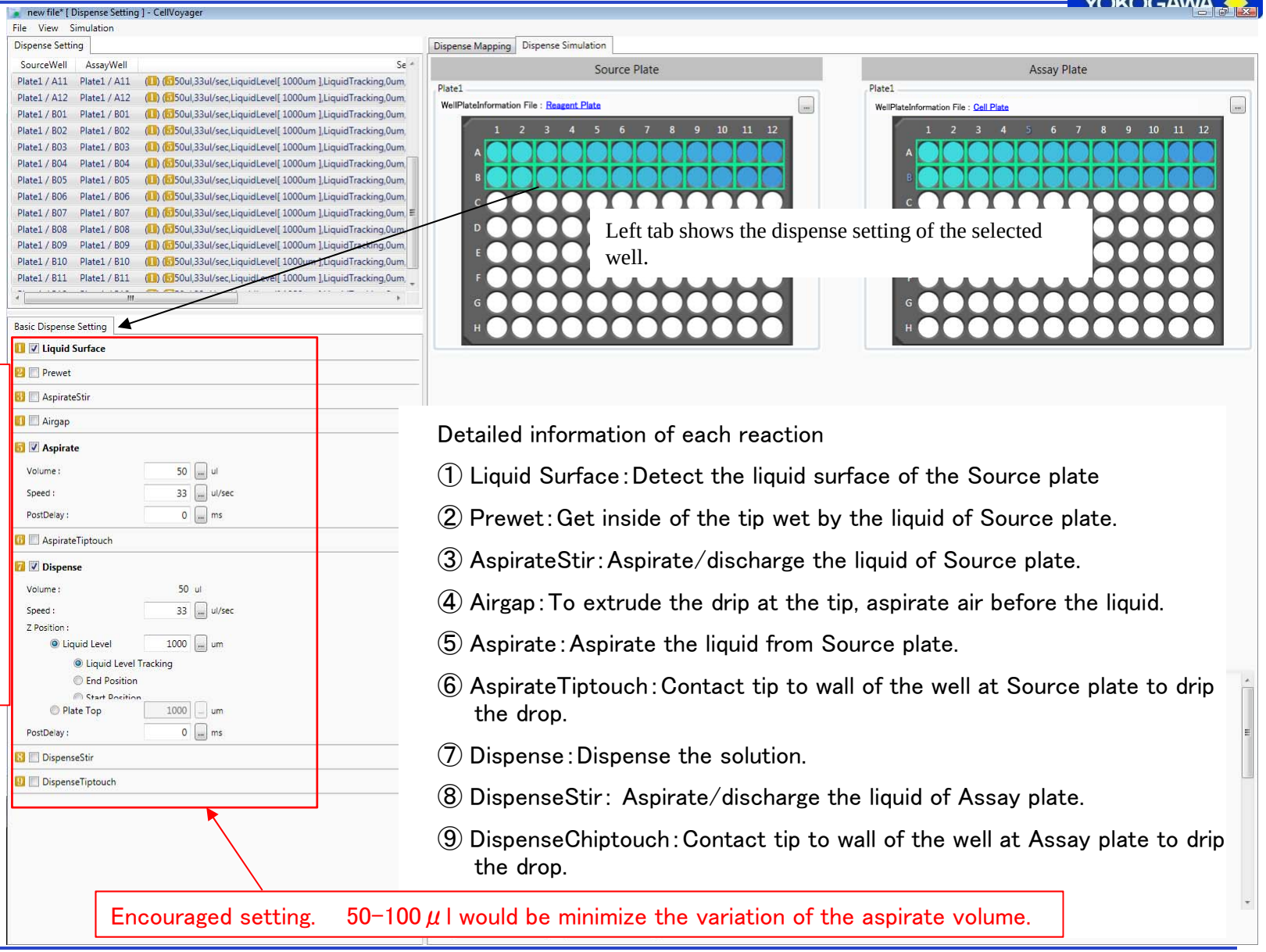
- Select “New” from the Dispense Settings at right side of the Main window.



① Select the types of Source Plate and Assay Plate.

② Select the wells from Source plate, and associate with each well Assay plate.

2.3 Dispense Settings



●Liquid Surface

●Aspirate
Volume 50ul
Speed 33 ul/sec

●Dispense
Volume 50ul
Speed 33ul/sec
Z Position 1000um
(Liquid Level Tracking)

Detailed information of each reaction

① Liquid Surface：Detect the liquid surface of the Source plate

② Prewet：Get inside of the tip wet by the liquid of Source plate.

③ AspirateStir：Aspirate/discharge the liquid of Source plate.

④ Airgap：To extrude the drip at the tip, aspirate air before the liquid.

⑤ Aspirate：Aspirate the liquid from Source plate.

⑥ AspirateTiptouch：Contact tip to wall of the well at Source plate to drip the drop.

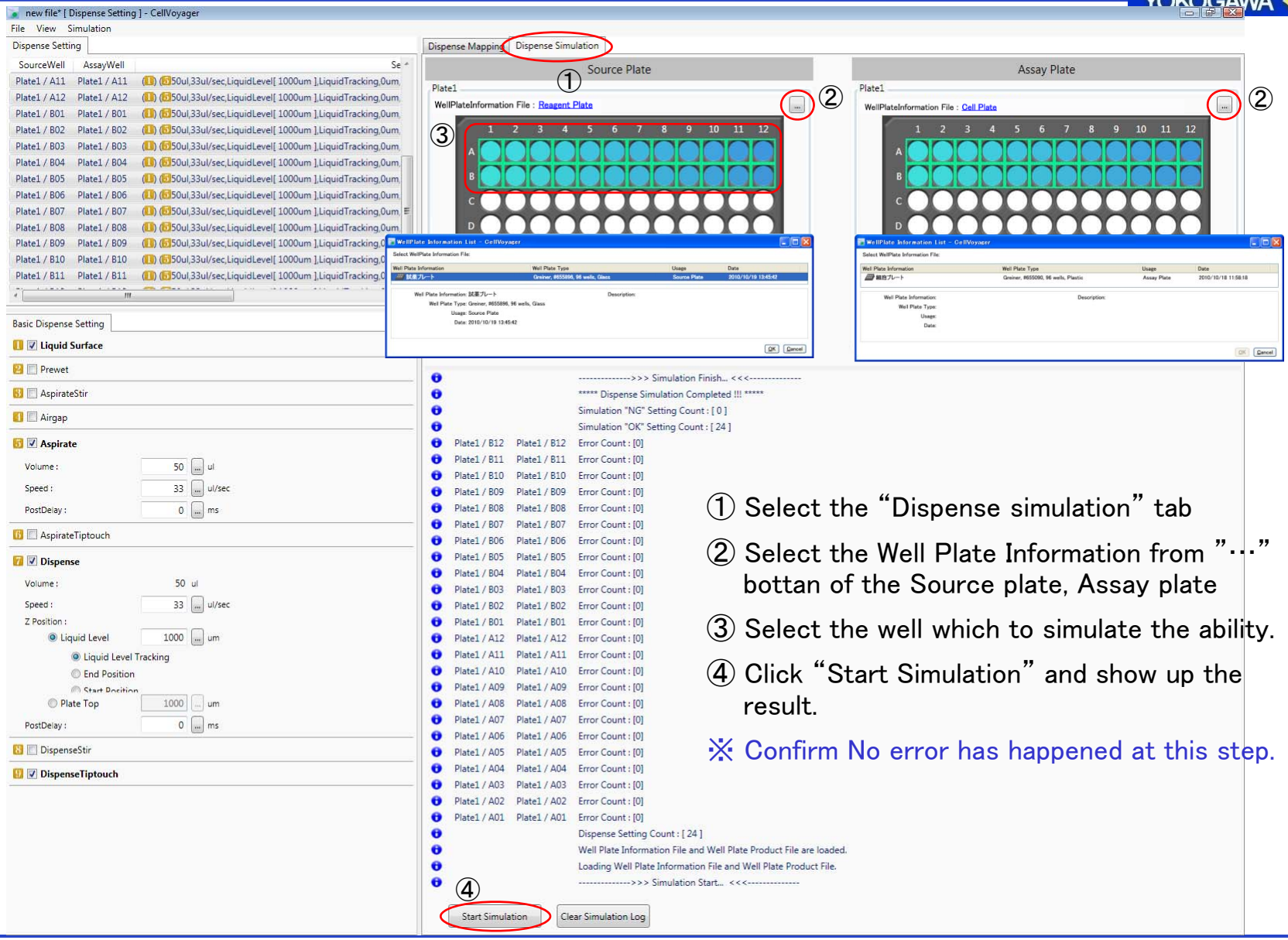
⑦ Dispense：Dispense the solution.

⑧ DispenseStir： Aspirate/discharge the liquid of Assay plate.

⑨ DispenseChiptouch：Contact tip to wall of the well at Assay plate to drip the drop.

Encouraged setting. 50−100 μl would be minimize the variation of the aspirate volume.

2.3 Dispense Settings



① Select the “Dispense simulation” tab

② Select the Well Plate Information from ”…” bottan of the Source plate, Assay plate

③ Select the well which to simulate the ability.

④ Click “Start Simulation” and show up the result.

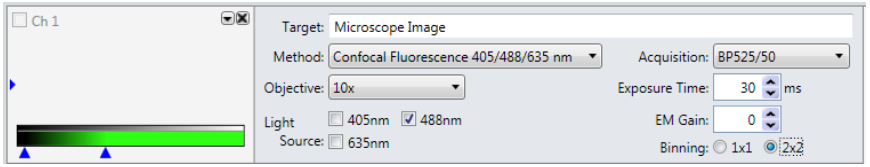
※ Confirm No error has happened at this step.

2.4 Setting of the Plate and Tip Rack

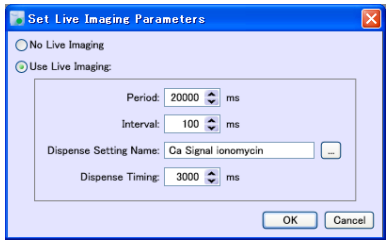
① Click “New ” Button of the Measurement setting area.

Select the products name of the Assay plate. Click ”New” and select the product name of the Assay plate. Display the measurement setting file .

② Setting of the acquisition channel.



③ Select Action List and display the high speed timelapse setting window from clicking”…”.



Live Imaging
ON：Use high speed time lapse
OFF：Only the usual time lapse

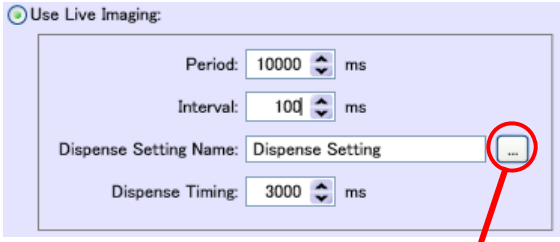
④ Select the “Use Live Imaging” and enter the condition.

Period：Period of the fast time lapse.

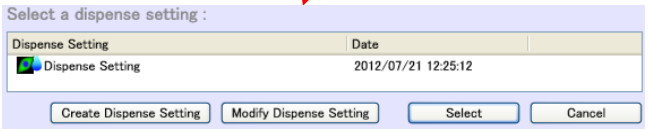
Interval：Interval of the high speed time lapse.

Dispense Setting Name：Dispenser setting file

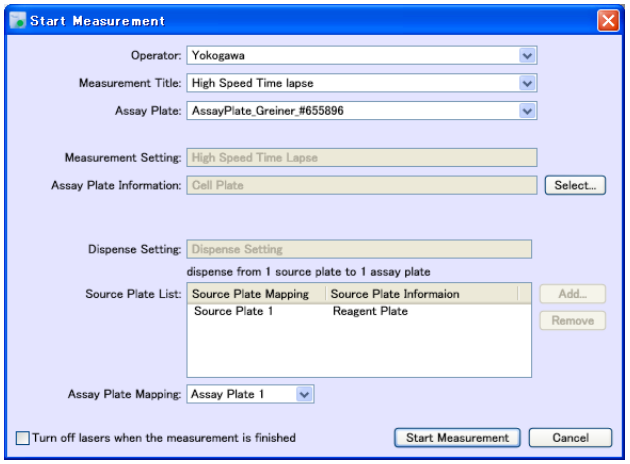
Dispense Timing：Time point which start dispensing.



This setting acquire every 50ms for 10 sec. The dispense timing is 3 sec and move to the next well after the 10 sec of image acquisition.

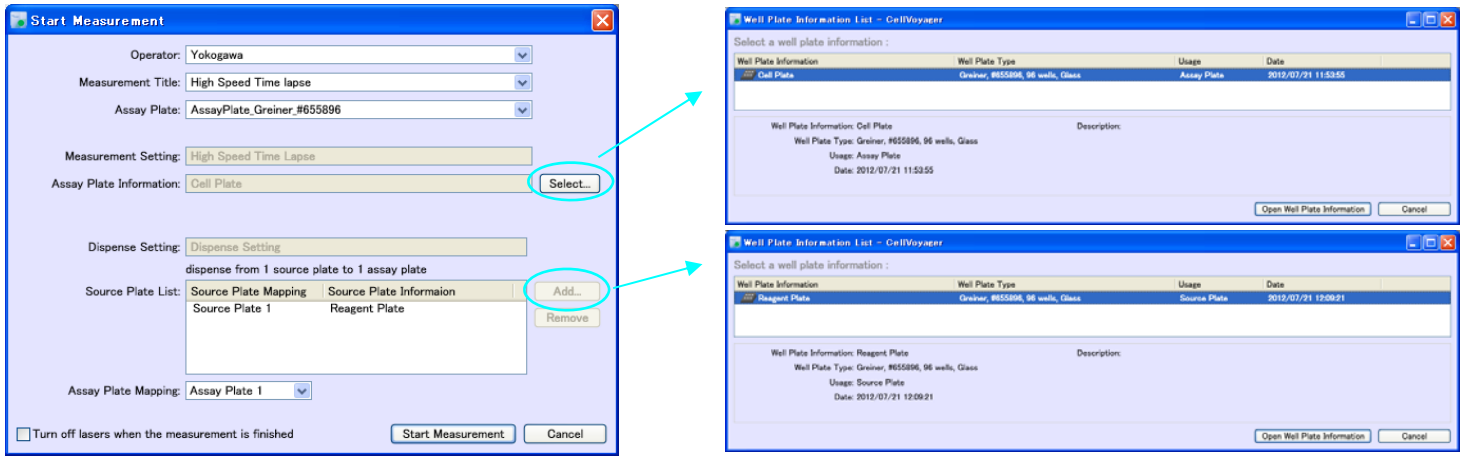


⑤Sever the setting file and start image acquisition.



2.5 High Speed Time Lapse

① Click ”Start Measurement“ of the Start Measurement and select the Assay plate and the Source plate.



CAUTION Please make sure the lid of the Assay / Source plate were certainly removed.
It may break the dispenser if the image acquisition were preformed by using the lid.

② Set the tip rack.
Click “Load” and the rack move to the position. The click “Get Status” to confirm the condition.