RICOH

RICOH Stereo Camera Software

R-Stereo-GigE-Player

User's Guide

RICOH Industrial Solutions Inc.

RICOH

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1. Function Overview

The main functions of the R-Stereo-GigE-Player software are as follows.

- Image display:
  Continuously capture and display intensity and depth images.

- Conversion to 3D point cloud:
  Convert the depth image to a 3D point cloud.

- Exposure time adjustment:
  Adjust the exposure time (shutter speed) of the camera.

- Projector control:
  Turn the projector on/off and control the brightness of the projector.

- Trigger settings:
  Configure trigger settings for IO with external hardware, e.g. use an external trigger source or output a strobe signal.

- Imaging mode:
  Choose the camera imaging mode from default mode or several High Dynamic Range (HDR) modes.

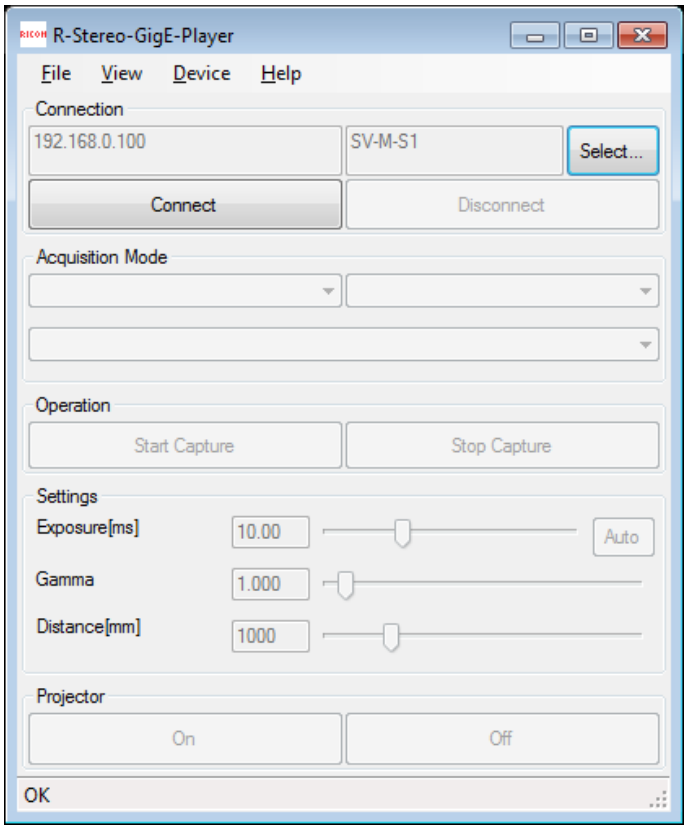
- Gamma settings:
  Adjust the gamma transformation of the camera’s brightness image.

- Measurement range settings:
  Adjust the distance range for which the depth image is output.

2. Startup Procedure

2.1 First, check that the power cable and LAN cable are connected to the camera.
2.2 Select "Start" - "All Programs" - "R-Stereo-GigE-Package X.X.X.XX" - "R-Stereo-GigE-Player" to launch R-Stereo-GigE-Player.

2.3 The operation window and image display windows of R-Stereo-GigE-Player appear.



Operation window

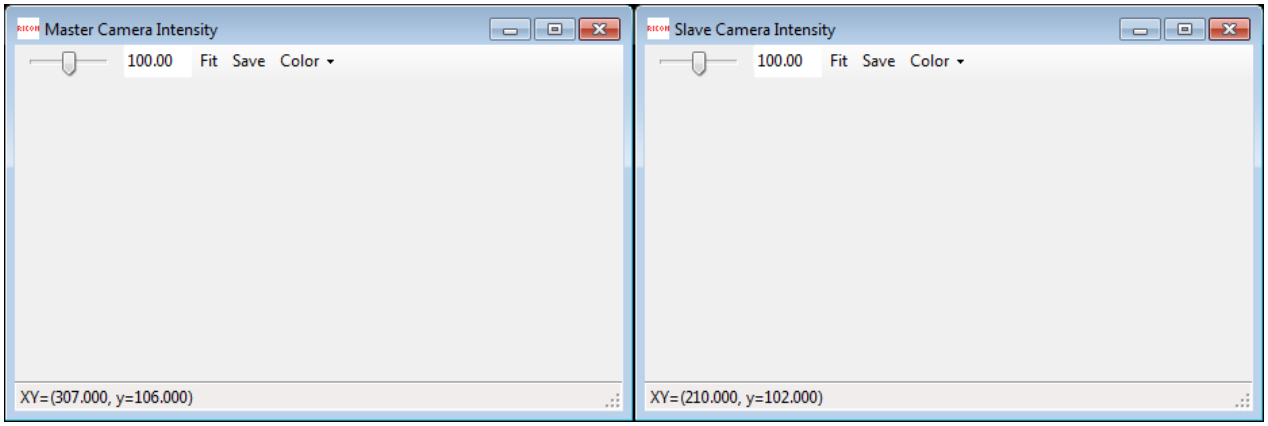
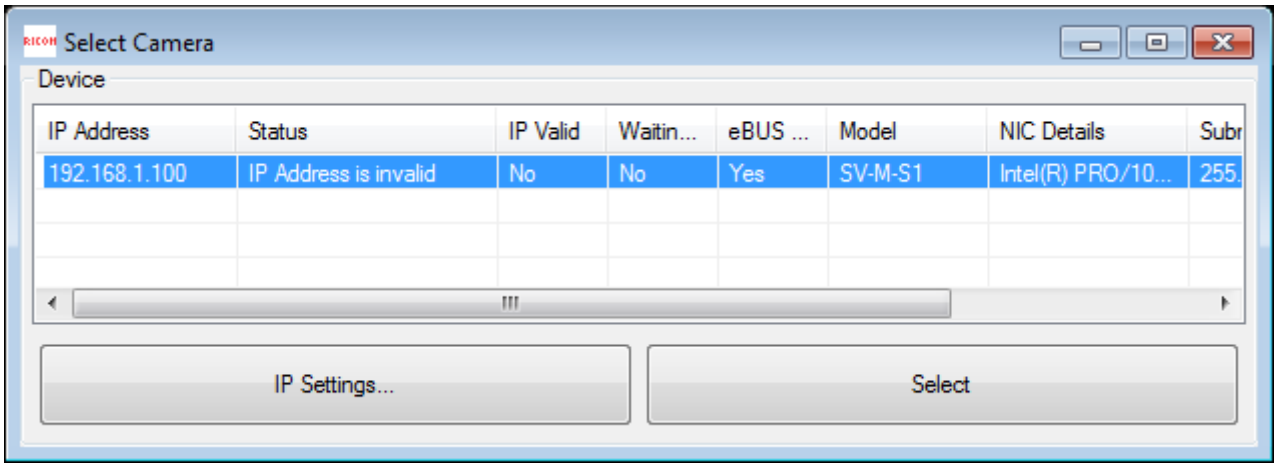


Image display window (master camera)

Image display window (slave camera)

2.4 Click the Select button to display the Select Device dialog box, click the camera to use, and click the IP Settings button.

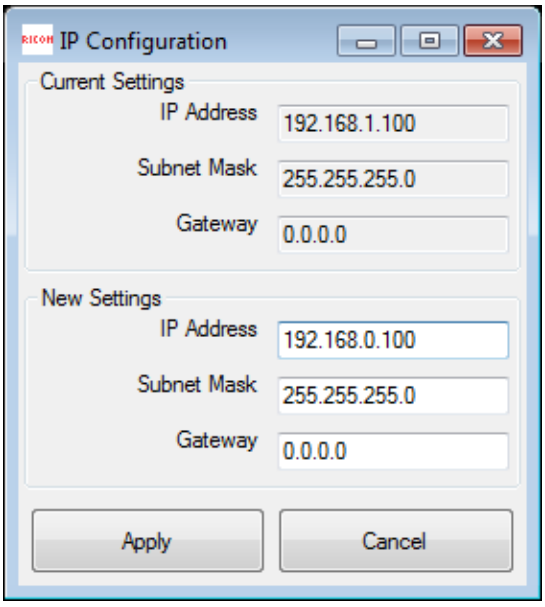


2.5 The IP Settings dialog box appears. The initial IP address and subnet mask of the camera are as shown below. Change the IP address and subnet mask settings of the camera to match the IP address of your PC environment (for the setting procedure, refer to section 4).

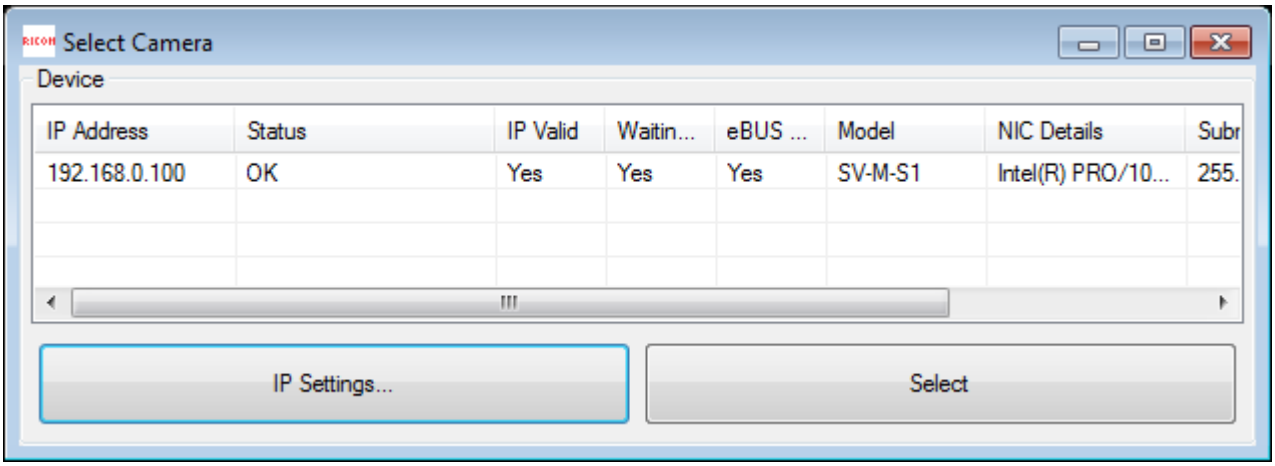
When configuring the settings, set an IP address that will not duplicate that of a camera or PC within the same network.

Initial IP address of camera: 192.168.0.100
Initial subnet mask of camera: 255.255.255.0

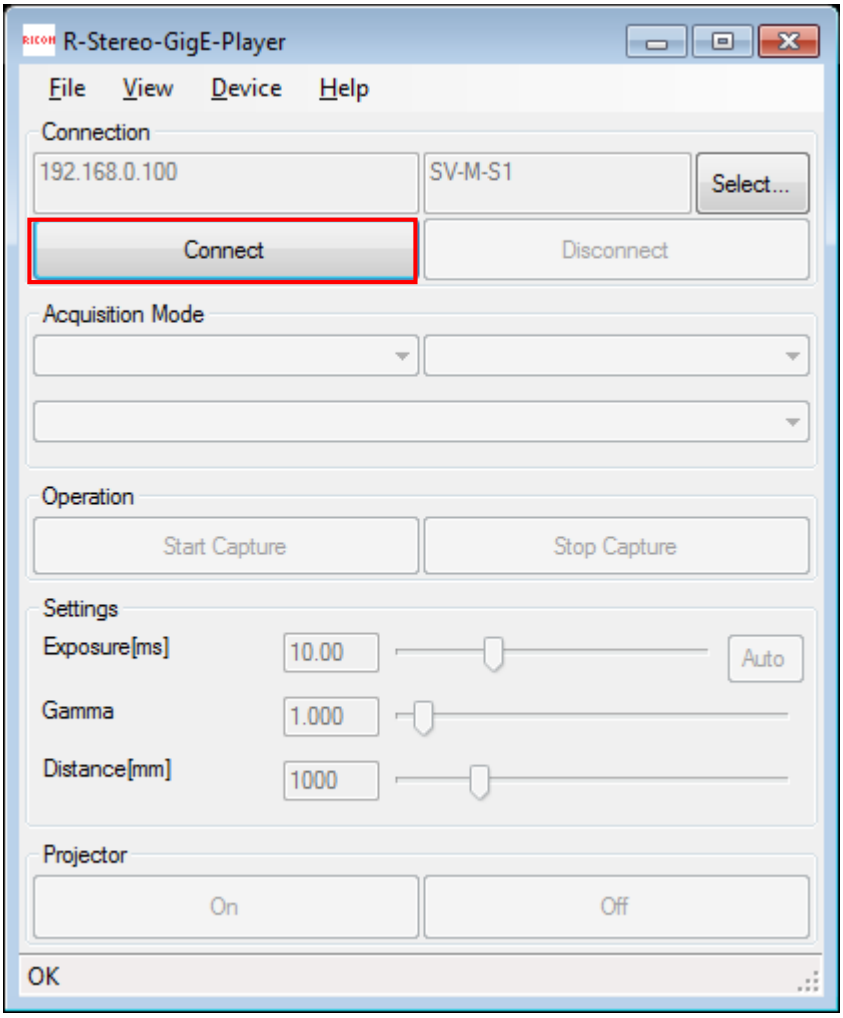
After configuring the settings, click the Apply button.



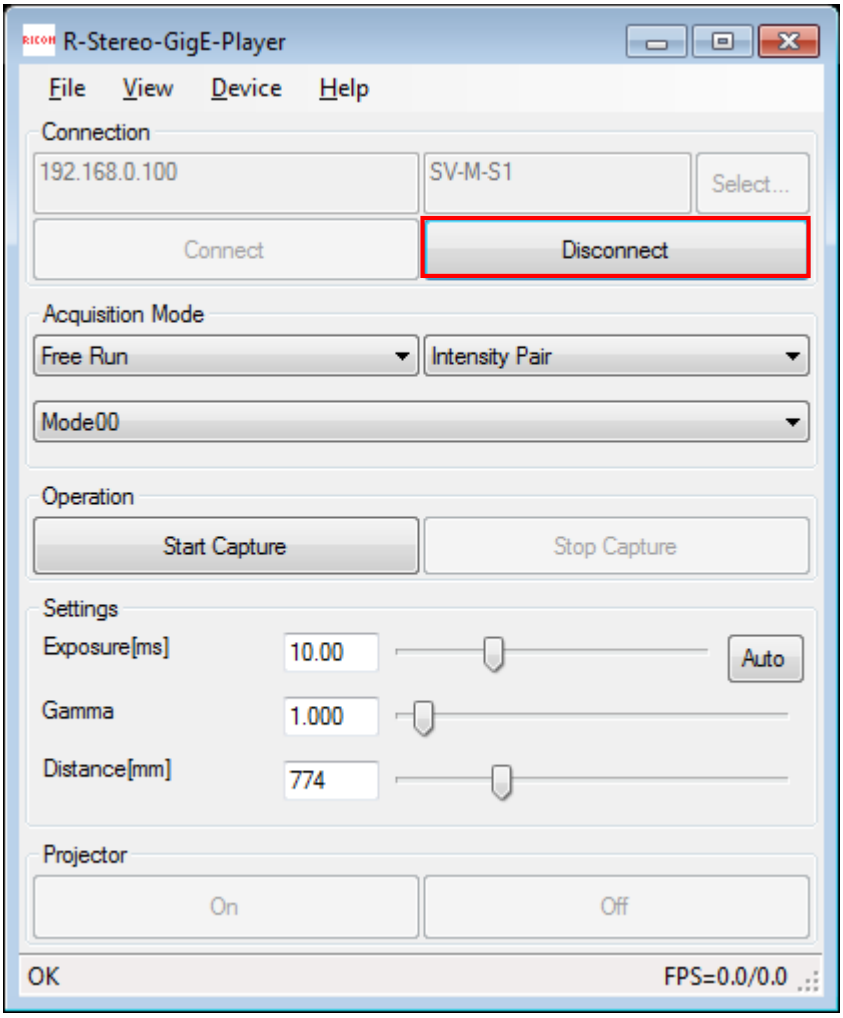
2.6 When the status changes to OK, the IP settings are complete.
Click the Select button to close the dialog box.


Select Camera
Device
IP Address
Status
IP Valid
Waitin...
eBUS ...
Model
NIC Details
Subr
192.168.0.100
OK
Yes
Yes
Yes
SV-M-S1
Intel(R) PRO/10...
255.
IP Settings...
Select

2.7 Click the Connect button.

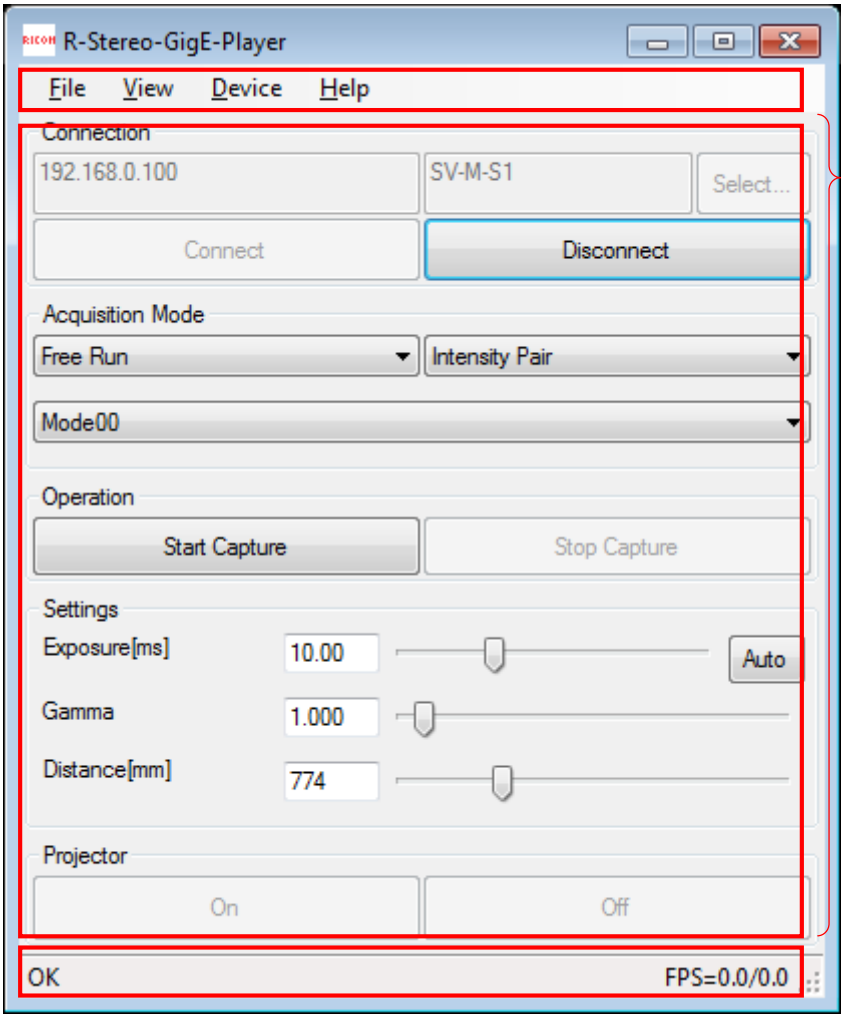


2.8 If the Disconnect button becomes available, the connection is successful.
To disconnect from the camera, click the Disconnect button.


R-Stereo-GigE-Player
File
View
Device
Help
Connection
192.168.0.100
SV-M-S1
Select...
Connect
Disconnect
Acquisition Mode
Free Run
Intensity Pair
Mode00
Operation
Start Capture
Stop Capture
Settings
Exposure[ms]
10.00
Auto
Gamma
1.000
Distance[mm]
774
Projector
On
Off
OK
FPS=0.0/0.0

3. Operating Procedures

This section describes how to use the operation window and image display windows.



Menu bar
Refer to section 3.1

Operation panel

Connection
Refer to section 3.2.1

Acquisition mode
Refer to section 3.2.2

Operation
Refer to section 3.2.3

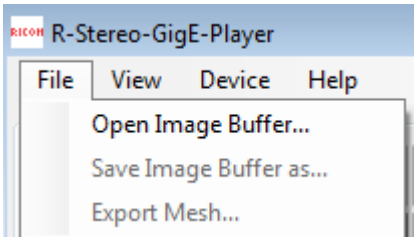
Settings
Refer to section 3.2.4

Projector
Refer to section 3.2.5

Status bar
Refer to section 3.3

3.1 Menu Bar

3.1.1 File Menu

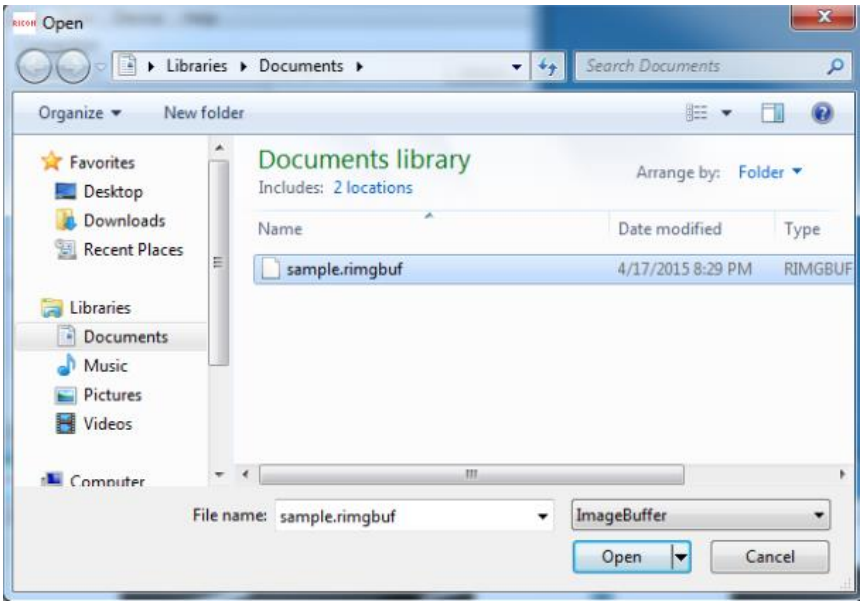


Refer to section 3.1.1.1
Refer to section 3.1.1.2
Refer to section 3.1.1.3

3.1.1.1 Opening an Image Buffer

Display an image in the image display window.

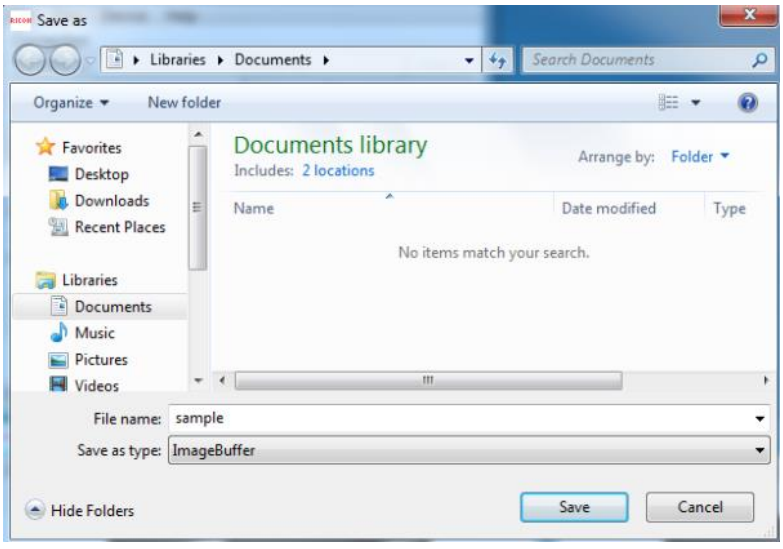
a) Click the Disconnect button to disconnect the PC and camera.
b) Select "Open Image Buffer" to open a dialog box.
c) Specify the ***.rimgbuf file that was saved to an arbitrary folder in advance and then click the Open button.
d) The image is displayed in the image display windows.



3.1.1.2 Saving Image Buffer under a Different Name

Save captured image to an image buffer file on the PC.

a) Click the Start Capture button to capture an image to the PC.
b) Select "Save Image Buffer As" to open a dialog box.
c) Specify the save destination and file name and then click the Save button to save a ***.rimgbuf format file.

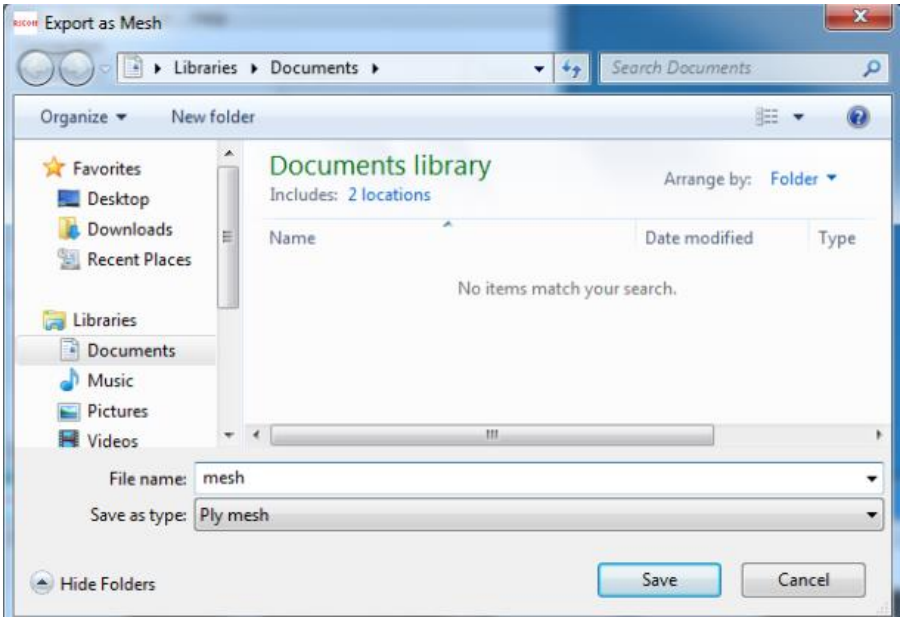


3.1.1.3 Exporting the Mesh

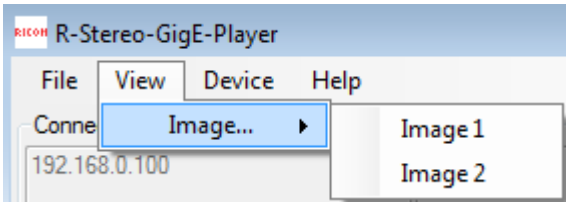
Save the 3D point cloud data (***.ply format file).

a) Click the Connect button to connect to the camera.
b) Select "Intensity + Depth" or "Depth" for the capture mode.
c) Click the Start Capture button to obtain images.
d) Click the Stop Capture button to stop obtaining images.
e) Select "Export Mesh" to open a dialog box.
f) Specify the save destination and file name and then click the Save button to save a ***.ply format file.

Only the region that is selected by the mask is included in the point cloud.
You can check the 3D point cloud using suitable viewer software for ply format files.



3.1.2 View Menu



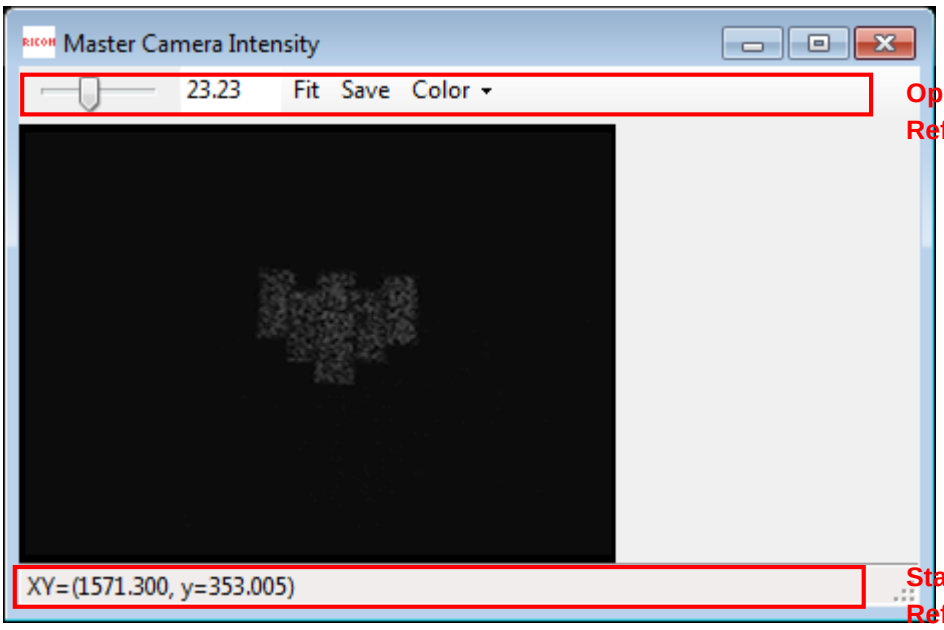
Refer to section 3.1.2.1

3.1.2.1 Image 1/Image 2

The windows of image 1 and image 2 are displayed when R-Stereo-GigE-Player is started.
To display them again after they have been closed, select these menu items.

The displayed image is switched depending on the pixel type. (Refer to the following table.)

Pixel type	Image 1	Image 2
Intensity Pair	Base camera intensity	Slave camera intensity
Intensity + Depth	Base camera intensity	Base camera depth
Depth	Base camera depth	No data



Operation Panel
Refer to section 3.1.2.1.1

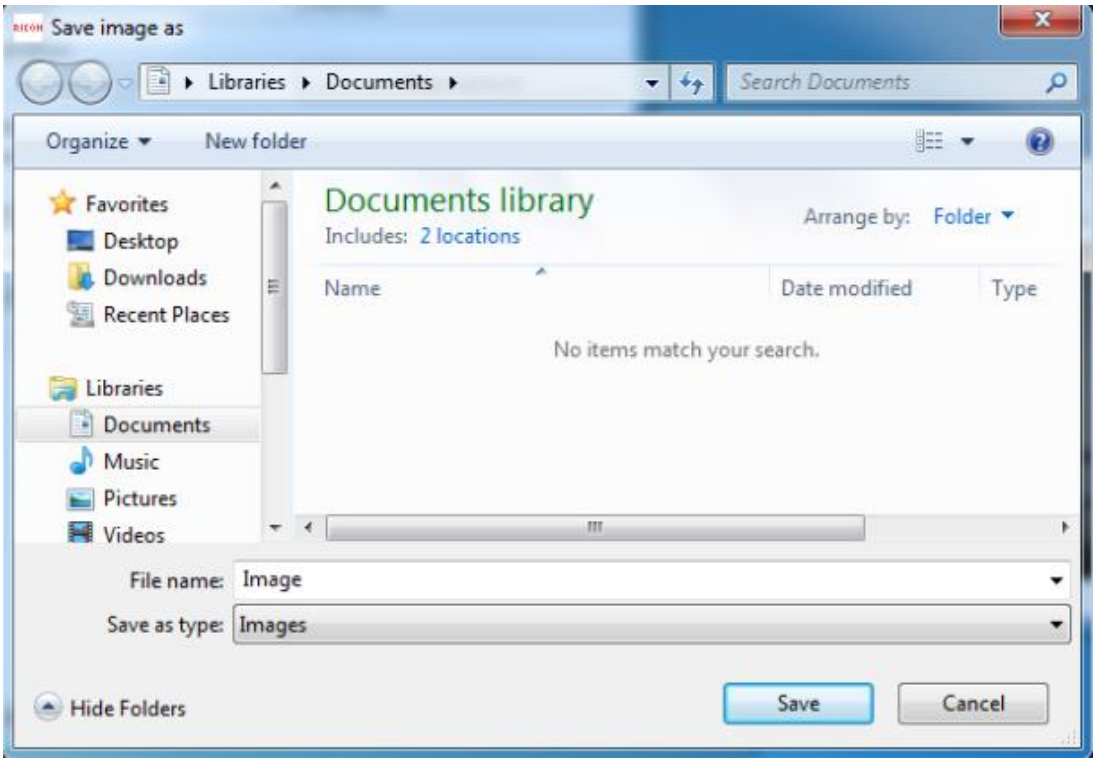
Status bar
Refer to section 3.1.2.1.2

3.1.2.1.1 Operation Panel

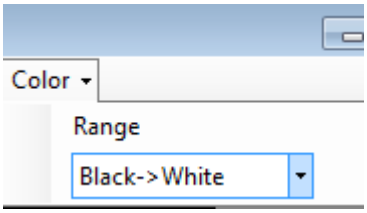
3.1.2.1.1.1 Zoom In/Zoom Out
Adjust the magnification of the displayed image.
Adjust the magnification by entering a value in the text box or dragging the slide bar.

3.1.2.1.1.2 Image Size Adjustment
Click the Fit button to automatically adjust the image size to fit the image display window size.

3.1.2.1.1.3 Save Image
Save the image.
Enter the folder and file name and press the Save button to save the image.

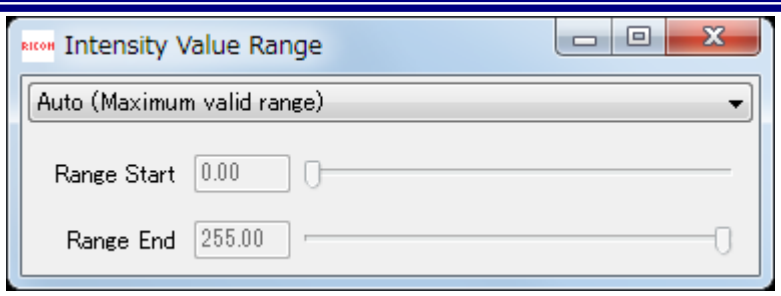


3.1.2.1.1.4 Display Color
Adjust display color details.



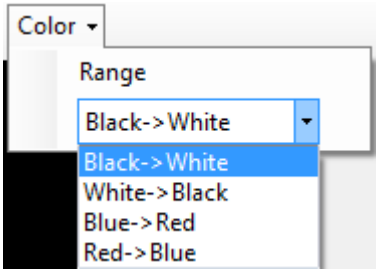
Refer to section 3.1.2.1.1.4.1
Refer to section 3.1.2.1.1.4.2

3.1.2.1.1.4.1 Range
Select Range to display the Range settings dialog.



In “Auto” mode, the display color range is automatically adjusted to the range of valid values.
In “Manual” mode, the display color range may be adjusted manually.
For intensity images, the valid value range is from 0 (dark) to 255 (bright). For depth images, the valid range depends on the camera settings and specifies the distance in millimeters.

3.1.2.1.1.4.2 “Black->White” ComboBox



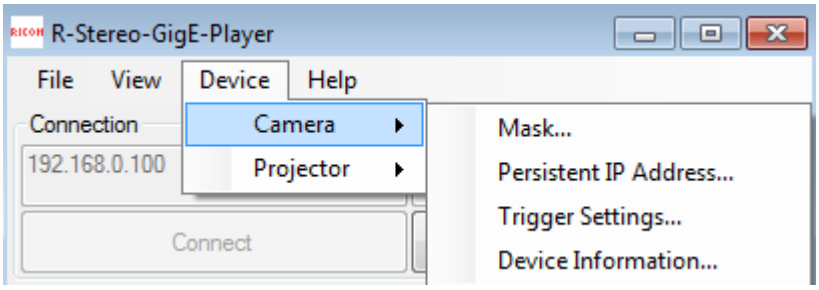
You can select the image display color from the following four types.
The relationship between the display color and the intensity image and depth image is as follows.

Display color	Image value	Depth	Intensity
Black → white	Small → large	Near → far	Dark → light
White → black			
Blue → red			
Red → blue			

3.1.2.1.2 Status Bar
The X and Y coordinates and pixel value are displayed in the status bar when you move the mouse pointer over the displayed image. For intensity images, the pixel value is its intensity value. For depth images, the three-dimensional XYZ coordinates in millimeters are displayed.

3.1.3 Device Menu

3.1.3.1 Camera

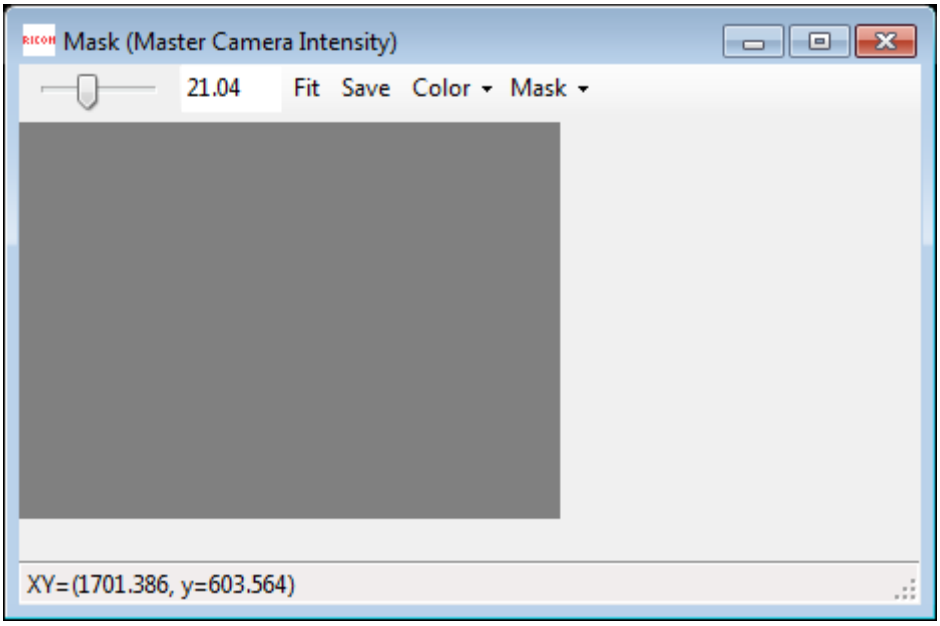


Refer to section 3.1.3.1.1
Refer to section 3.1.3.1.2
Refer to section 3.1.3.1.3
Refer to section 3.1.3.1.4

3.1.3.1.1 Mask

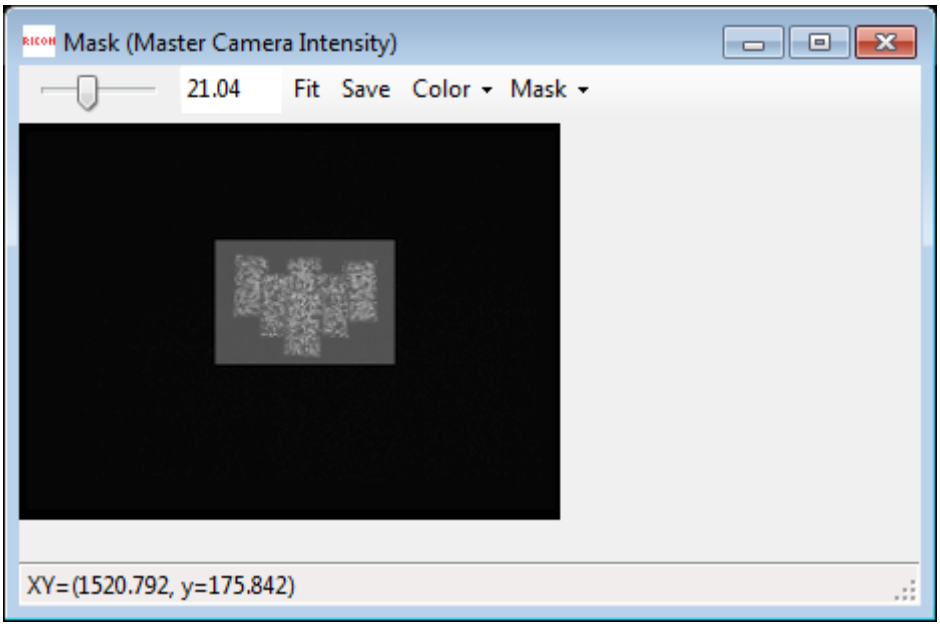
The mask specifies a region in the base camera image. Automatic exposure adjustment and mesh export functions only use the region that is specified by the mask.
For details on automatic exposure adjustment, refer to section 3.2.4.2.

a) Select " Mask" to open the dialog for mask editing.
For details on how to use the image display window, refer to section 3.1.2.1.
The bright area is the mask area. The mask area is initially set to the entire image area.

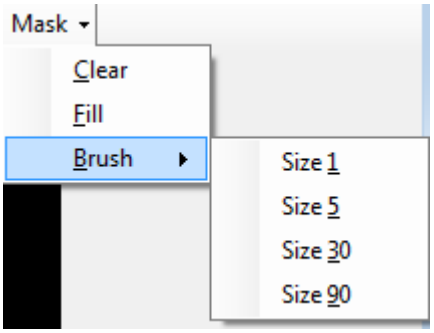


b) Edit the mask.
By holding down mouse buttons while dragging the mouse, you can edit the mask.
・Right mouse button: Add area to the mask
・Middle mouse button: Remove area from the mask

The following shows an example of the center of the image area set as the mask.



You can clear the mask (unmask entire image), fill the mask (mask entire image) and select the mask brush size from the operation panel.



3.1.3.1.2 IP Settings in Non-volatile Memory

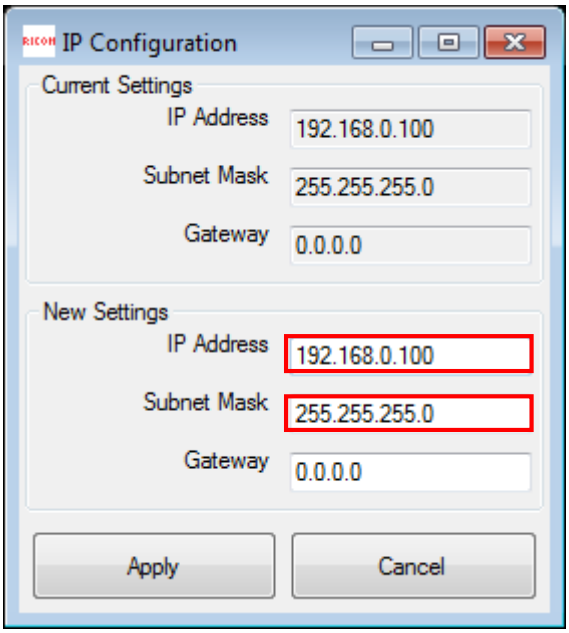
Save the IP settings of the camera.

Set an IP address and subnet mask for "New settings" that match your PC environment and then click the "Apply" button.

The IP address and subnet mask settings are saved to the non-volatile memory of the camera.

They are reflected after the camera is restarted.

Note: Please be careful because the camera may become inaccessible from the PC if invalid IP settings are configured.

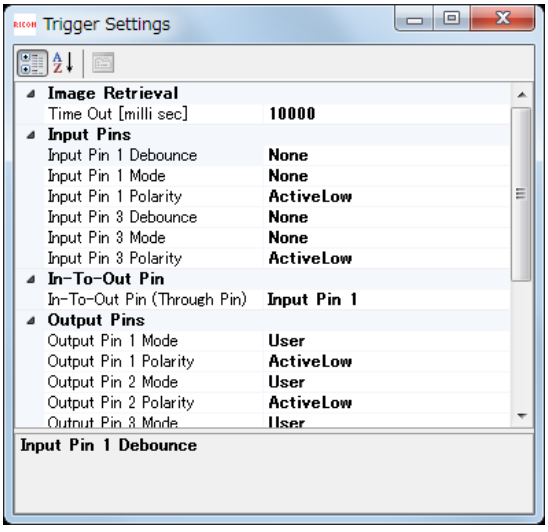


3.1.3.1.3 Trigger Settings

Shows the dialog for the camera's trigger settings.

In "External Trigger" mode, the "Time Out [milli sec]" (below "Image Retrieval") specifies the maximum time from pressing the "Start Capture" button to image retrieval. If the external trigger signal is not input to the camera and no image is received by the PC within this time, a timeout will occur.

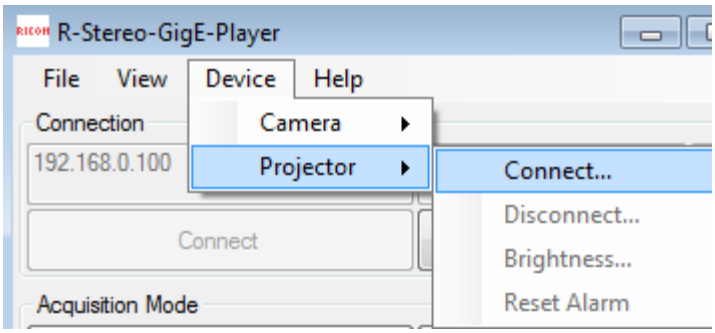
For details about the trigger settings, please refer to the stereo camera's external hardware trigger user's guide.



3.1.3.1.4 Device Information

Display the firmware version and license information of the camera.

3.1.3.2 Projector



Refer to section 3.1.3.2.1

Refer to section 3.1.3.2.2

Refer to section 3.1.3.2.3

Refer to section 3.1.3.2.4

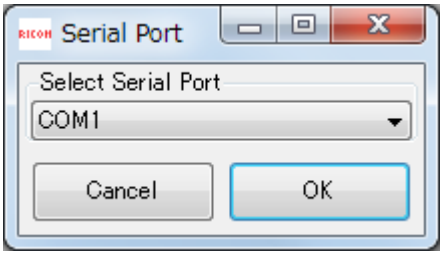
Check that the following items have been performed in advance.

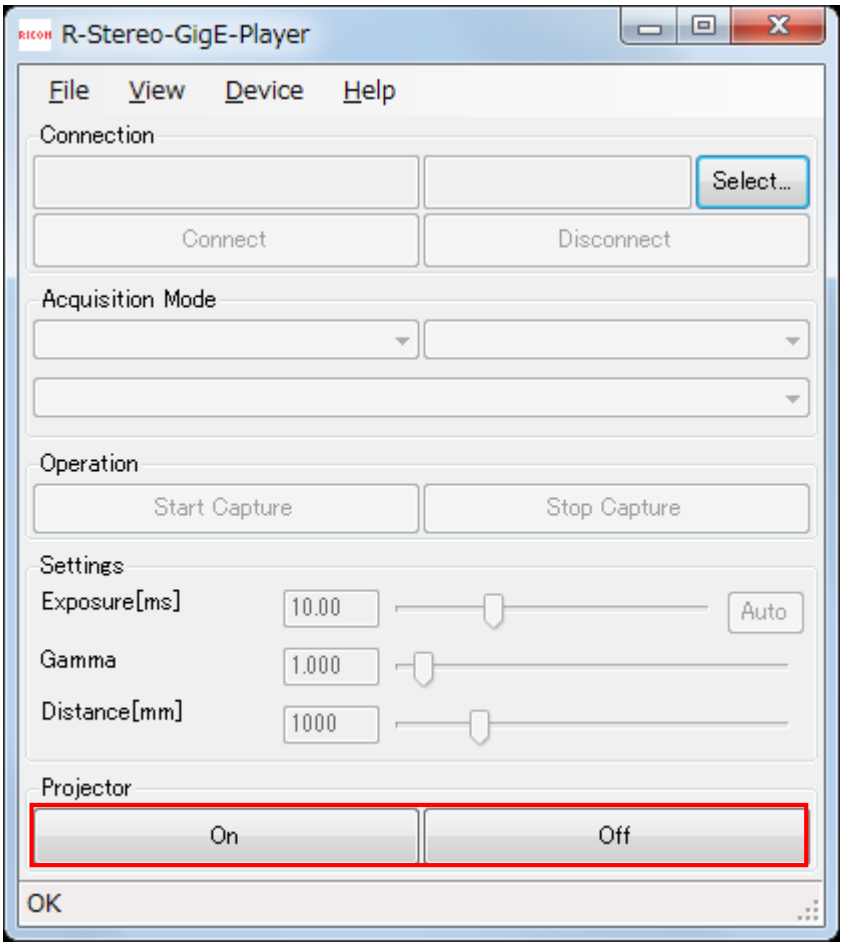
- Power of the lighting has been turned on.
- PC mode has been selected with the Mode button.
- The lighting and PC have been connected with a USB-serial adapter cable.
- The driver for the USB-serial adapter cable has been installed on the PC.

Power Section of Lighting

3.1.3.2.1 Connection

Select "Connect" to open the Serial Port setting dialog box.
Select the serial port with the cable connected and then click the OK button.
If the ON and OFF buttons become available, the connection is successful.





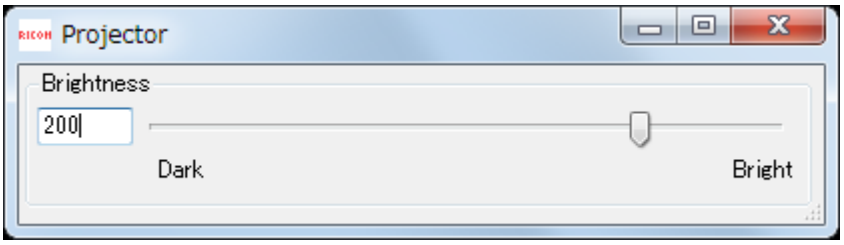
3.1.3.2.2 Disconnecting

Select the Disconnect button to disconnect the projector and PC.
If the ON and OFF buttons become unavailable, the disconnection is successful.

3.1.3.2.3 Brightness

Select "Brightness" to display the slide bar for adjusting the brightness of the lighting.

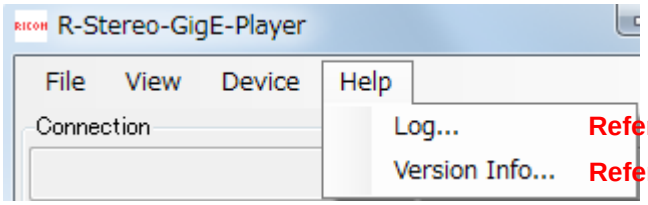
Adjust the brightness appropriately to suit the capture environment.



3.1.3.2.4 Reset Alarm

If the projector becomes abnormally hot, an alarm sounds.
To stop the alarm, select "Reset Alarm."

3.1.4 Help Menu



Refer to section 3.1.4.1
Refer to section 3.1.4.2

3.1.4.1 Log

Select "Log" to display the log information.

3.1.4.2 Version Information

Select "About R-Stereo-GigE-Player" to display the version information of the software.

3.2 Operation Panel

3.2.1 Connection

For details, refer to "2. Startup Procedure."

3.2.2 Acquisition Mode

Change the imaging mode to suit the images you wish to obtain.
Depending on the stereo camera model and its firmware, some modes may not be available.

Image Acquisition Mode	Functionality
Free run	This mode obtains images constantly from the camera after capturing is started.
Software trigger	This mode obtains images from the camera only when the Start Capture button is clicked.
External trigger	The application will start to wait for image retrieval when Start Capture button is clicked. The image is displayed after retrieval. If no image is retrieved during the time out set in the trigger settings, the application stops waiting for image retrieval.

Pixel Type	Functionality
Intensity	This mode obtains base and slave camera intensity images from the camera.
Intensity + Depth	This mode obtains base camera intensity and depth images from the camera.
Depth	This mode obtains only depth images from the camera. The speed for transferring data between the camera and PC can be increased.

Imaging Mode	Functionality
Mode00	Imaging Mode 00: This is the default imaging mode.
Mode01	Imaging Mode 01: Enhances contrast in dark areas and reduces contrast in bright areas.
Mode02	Imaging Mode 02: High Dynamic Range (narrow) mode; covers a wider dynamic range than Mode00
Mode03	Imaging Mode 03: High Dynamic Range (middle) mode; covers a wider dynamic range than Mode02.
Mode04	Imaging Mode 04: High Dynamic Range (wide) mode; covers a wider dynamic range than Mode03.

3.2.3 Operation

Click the Start Capture button to start obtaining images from the camera.
Click the Stop Capture button to stop obtaining images from the camera.
The Stop Capture button is not available in the software trigger mode.

3.2.4 Settings

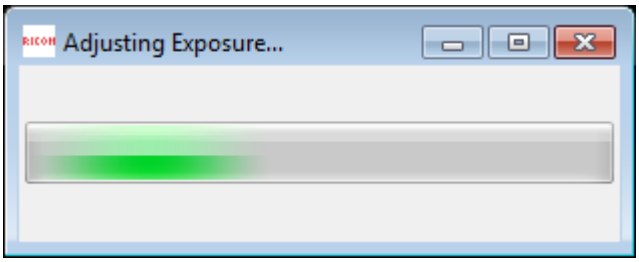
3.2.4.1 Manual Exposure Adjustment

Set the exposure time (shutter speed) of the camera manually.
The exposure time can be adjusted by entering a value in the text box or dragging the slide bar.

3.2.4.2 Automatic Exposure Adjustment

The exposure time of the camera can be set automatically so that the most stable depth of the capture target is obtained.
The exposure time is set according to the mask.
(For details on the mask, refer to section 3.1.3.1.1.)

Click the Adjust button. The Adjusting Exposure... window appears and then disappears when adjustment is complete.



3.2.4.3 Gamma Settings

Adjusting gamma alters the intensity image brightness, and depending on the imaging conditions, may improve the depth image quality. The default gamma value is 1.0; the image gets brighter for higher values.
Note that for cameras with old firmware, this functionality is disabled.

3.2.4.4 Distance Settings

Set the start distance of the stereo camera depth measurement range. The end distance of the measurement range is then automatically adjusted internally. The new distance range is displayed in the status bar.
Please note that values different from the default value may reduce measurement accuracy.
Also note that for cameras with old firmware, this functionality is disabled.

3.2.5 Projector

While there is a connection to the projector, click the ON button to turn on the projector light.
Click the OFF button to turn off the projector light.
If you wish to adjust the brightness of the projector, refer to section 3.1.2.2.3.

3.3 Status Bar

3.3.1 Execution Result

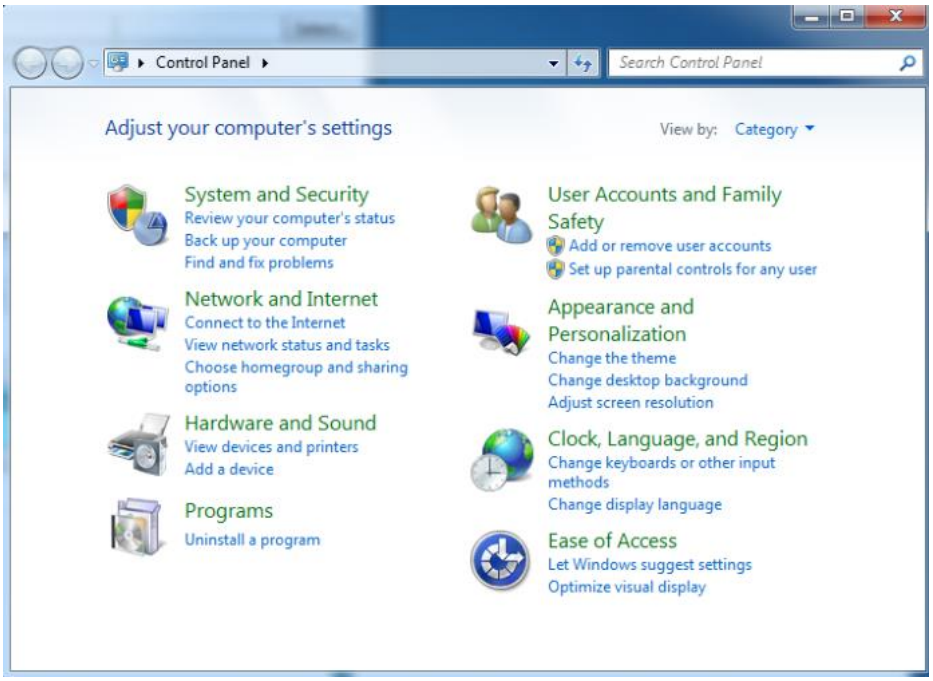
The result of executing "Connect," "Start Capture," or other operations is displayed at the left side of the status bar.
If the operation ends successfully, "OK" is displayed. If an error occurs, the details of the error are displayed.

3.3.2 Frame Rate

The numbers of frames drawn and received per second are displayed on the right side of the status bar.

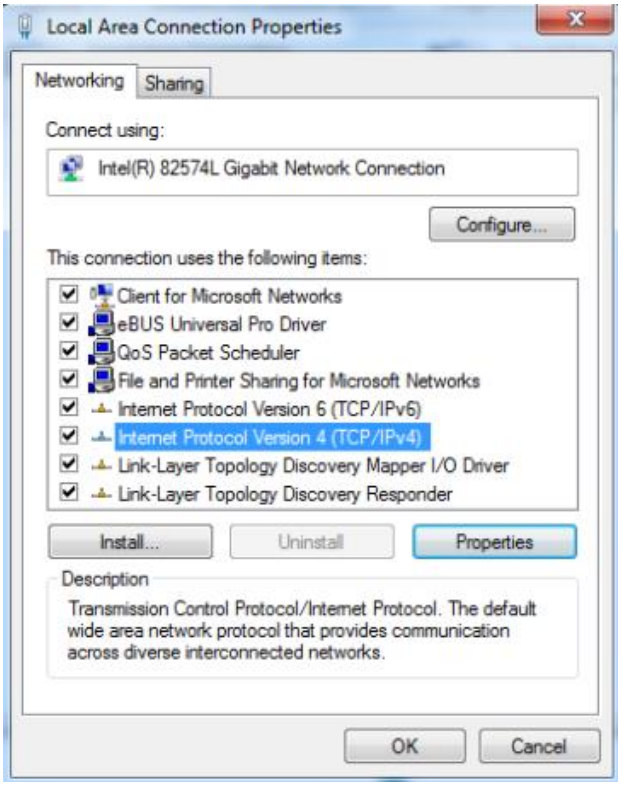
4 IP Address Settings of PC

Select "Start" - "Control Panel" - "Network and Internet" - "View network status and tasks" - "Change adapter settings" to display the network connections.



Right-click the network adapter that will connect to the camera and then select "Properties."

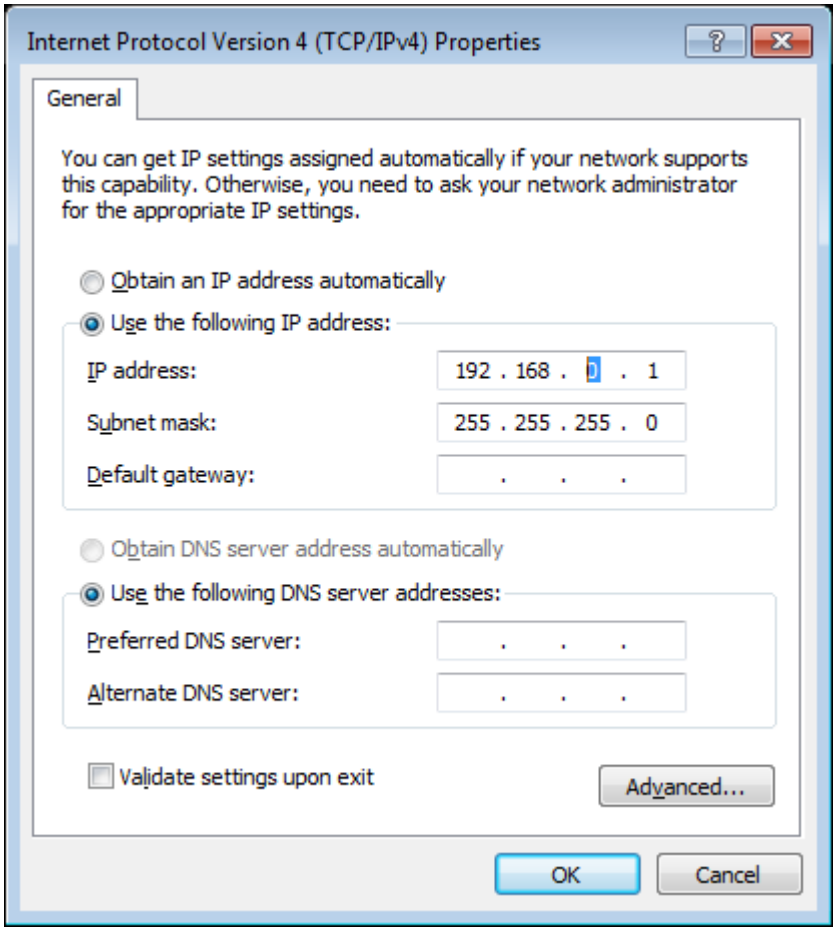
The properties dialog box for the network adapter that will connect to the camera appears.



Select "Internet Protocol Version 4 (TCP/IPv4)" and then click the Properties button.

If both TCP/IPv6 and TCP/IPv4 are displayed, select TCP/IPv4.)

Set the IP address and subnet mask in the properties dialog box for the network adapter that will connect to the camera. Here we show an example of changing the address of the PC to 192.168.0.1.



Select "Use the following IP address" and set the IP address and subnet mask.
Set the IP address to 192.168.0.1.
Set the subnet mask to 255.255.255.0.

In this example, the first three parts of the IP address of the camera to be connected need to match the first three parts of the IP address of the PC.

If the subnet mask is set to 255.255.0.0, the first two parts of the IP address of the camera to be connected need to match the first two parts of the IP address of the network interface card.

Set an IP address that will not duplicate that of a camera or PC within the same network.

After setting the IP address and subnet mask of the PC, click the OK button to close the Internet protocol properties dialog box.

Revision History

Rev.	Date	Changes	Note
1.00	March 24, 2015	● Newly issued	
1.01	March 27, 2015	● Updated Updated description on connection procedure.	
1.02	June 16, 2015	● Updated Updated projector description.	
1.03	December 24, 2015	● Updated Updated descriptions of acquisition mode, trigger settings, gamma, start distance, and display color.	