WAT-01U2

User’s Manual

Rev. 1.00

Watec Co., Ltd.

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Revision Record

Rev.	Date	Changes	Remarks
1.00	August 28, 2013	–	Initial Release

Table of Contents

1. About this User's Manual

This User's Manual consists of instructions to connect the WAT-01U2 to a PC and describes and explains the settings for the Video Capture Pin/Video Capture Filter and describes the Snapshot feature which utilizes the GPIO connection.

When the settings of the WAT-01U2 is changed according to the WAT-01U2 user's manual, check to see that the operation and the effects of the changes made to the camera are acceptable.

The WAT-01U2 user manual is subject to change by design and the specifications of the product without notice.

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2. Connecting the WAT-01U2 with a PC

The diagram below shows the connections between the WAT-01U2 and a PC.

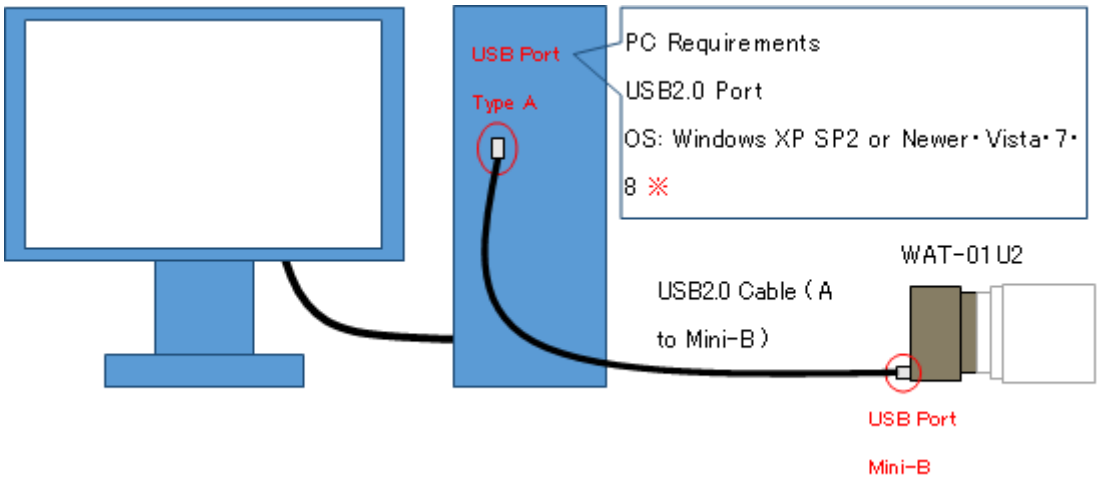


Fig.1 WAT-01U2 - PC Connection Diagram

※It is recommended that a version of Windows Vista or newer (and inclusive) be used. With Windows XP, it is possible to obtain video, however, there are some limitations to select functions. Please refer to Section 3 “Functions and Settings” for details.

WAT-01U2 is compatible with USB Video Class.
When the WAT-01U2 is connected to a PC for the first time, the Driver will be installed automatically. If the Driver installation does not occur, and the WAT-01U2 is not recognized by the PC, please check to make sure that the connection is correct, and please check that the PC requirements are met.

Please connect the camera to the PC, and after confirming that the camera is recognized, please start the viewer software and begin Preview/Capture of video.

3. Functions and Settings

The WAT-01U2 settings are separated into Video Capture Pin, which is used to set the output image size, and the Video Capture Filter, which is used to set the image brightness and color.

This section explains, each of the functions of the WAT-01U2 and their respective setting methods using the WatecCameraViewer(WAT-01U2 Capture Software which can be downloaded from our company's website, http://www.watec.co.jp/) as an example.
(For details on how to install the software, please refer to the readme.txt file included with the WatecCameraViewer software.)

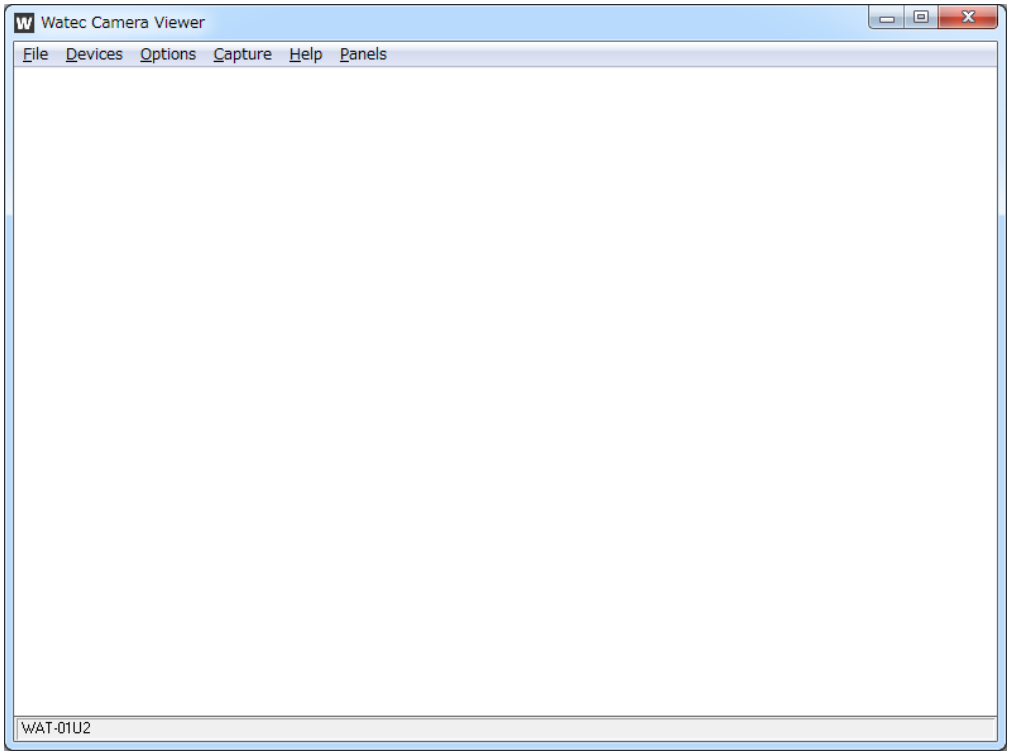


Fig.2 WatecCameraViewer Window

3.1.Video Capture Pin

The Color Space and Video Format can be set in the Video Capture Pin. The setting can be accessed from the menu at the top of the window (Options -> Video Capture Pin).

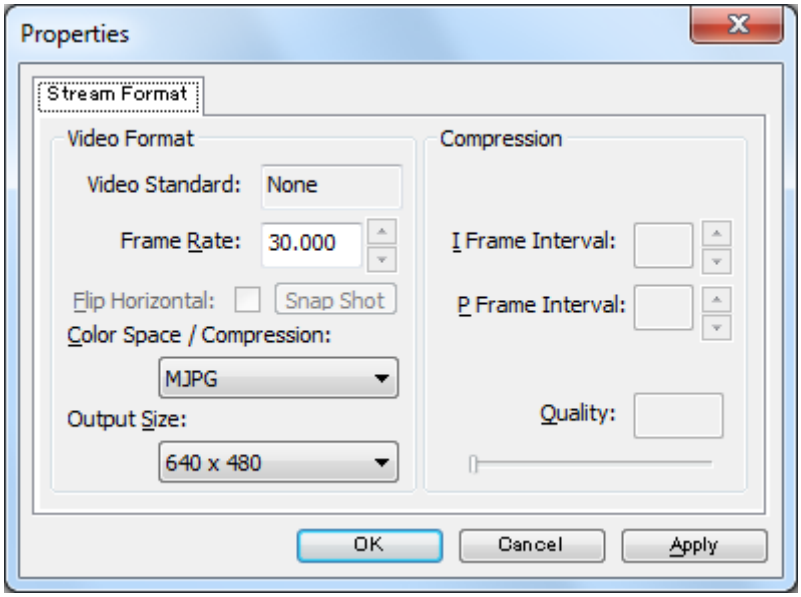


Fig.3 Video Capture Pin Window

The same settings can be adjusted from the Panels -> Camera Control menu at the top of the window.

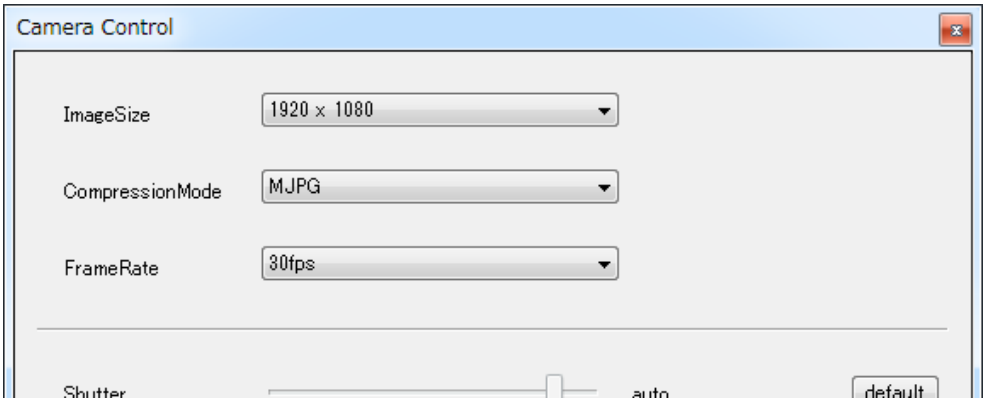


Fig.4 Camera Control Window

3.1.1.Color Space/Compression(Compression Mode)

Can be selected from YUY2 and MJPG.

YUY2: Uncompressed video output using YUY2(YUV422) format as Color Space. The resolution is higher than MJPG, however, the frame rate is limited as described in the later section.

MJPG: Output video is compressed with MJPG(Motion-JPEG) format. The resolution will decrease, however, the frame rate will be maintained even at the maximum image size.

3.1.2.Output Size(Image Size)

The video image output size of the WAT-01U2 is selected from the following 8 selections.

Image size (H x V)	Aspect Ratio	No. of Pixels	Typical Nomenclature
1920 × 1080	16 : 9	2,073,600	HD 1080p (Full-HD)
160 × 120	4 : 3	19,200	Quarter-Quarter-VGA
176 × 144	11 : 9	25,344	Quarter-CIF
320 × 240	4 : 3	76,800	Quarter-VGA
640 × 480	4 : 3	307,200	VGA(Video Graphics Array)
1280 × 1024	5 : 4	1,310,720	SXGA(Super-XGA)
1280 × 720	16 : 9	921,600	HD 720p
1280 × 800	16 : 10	1,024,000	WXGA(Wide-XGA)

3.1.3.Frame Rate

The frame rate will be fixed according to the Color Space/Compression mode and image size settings.

Color Space/ Compression	Image Size	Frame Rate (fps) ※
YUY2	1920 ×1080	5
	160 × 120	30
	176 × 144	30
	320 × 240	30
	640 × 480	30
	1280 × 1024	7.5
	1280 × 720	10
	1280 × 800	10
MJPG	1920 ×1080	30
	160 × 120	30
	176 × 144	30
	320 × 240	30
	640 × 480	30
	1280 × 1024	30
	1280 × 720	30
	1280 × 800	30

※fps: Frames Per Second, the number of frames processed per second in a video image, higher frame rates produce smoother, more fluid, video.

3.2.Video Capture Filter Image Adjustment(Video Proc Amp)

The output image can be adjusted by changing the 10 parameters below in the Video Capture Filter's Video Proc Amp tab. The setting is accessed by selecting Options -> Video from the menus at the top.

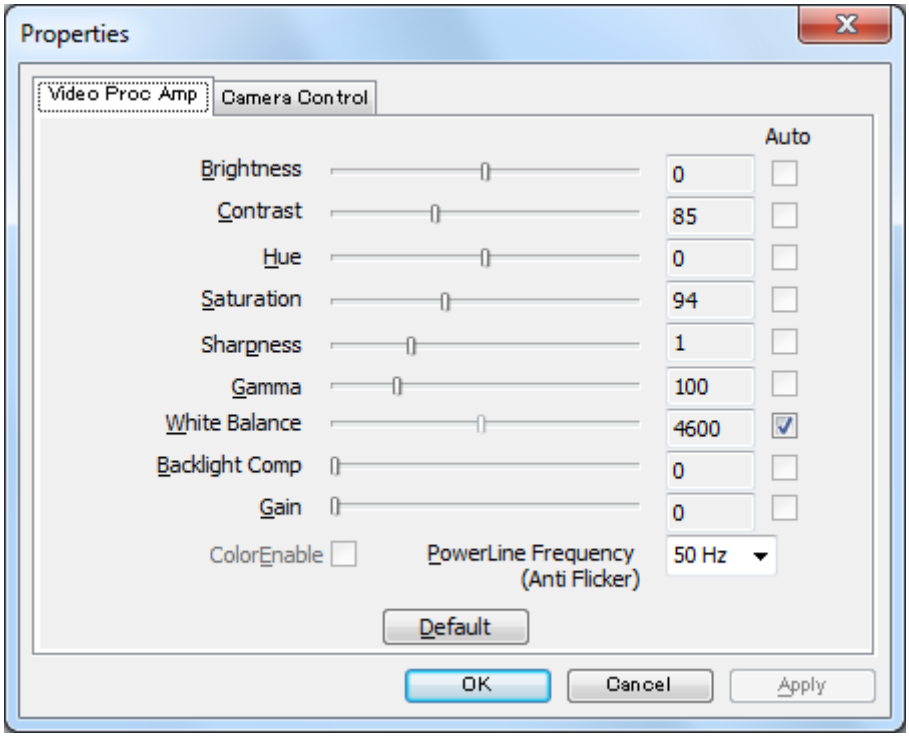


Fig.5 Video Capture Filter Video Proc Amp window

The same parameters can be changed from the Panels -> Camera Control menu at the top of the window.

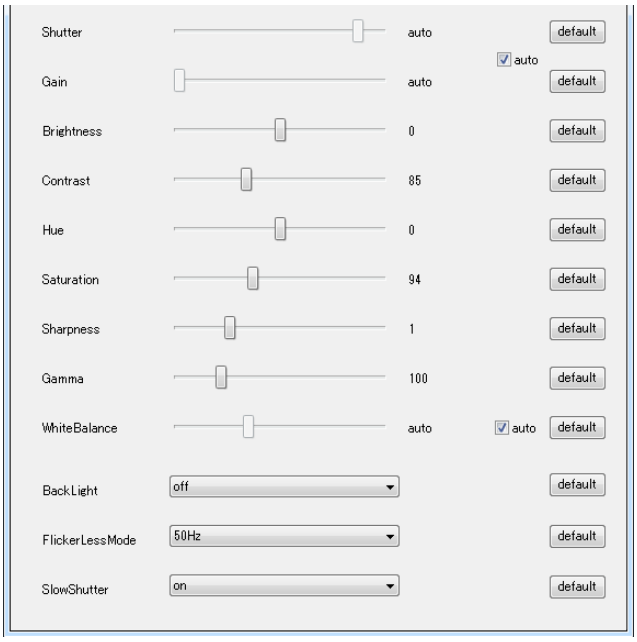


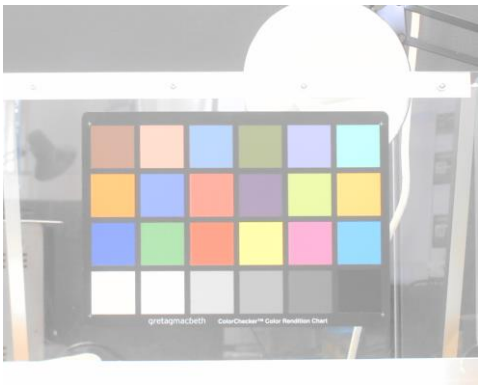
Fig.6 Camera Control window

3.2.1.Brightness

Increasing the value will increase the image brightness.
Default value is “0”. Adjustment is made between the range of -128 – 127.


Brightness@-128


Brightness@0


Brightness@127

3.2.2.Contrast

Increasing the value will increase the contrast.
Default value is “85”. Adjustment is made between the range of 0 – 255.

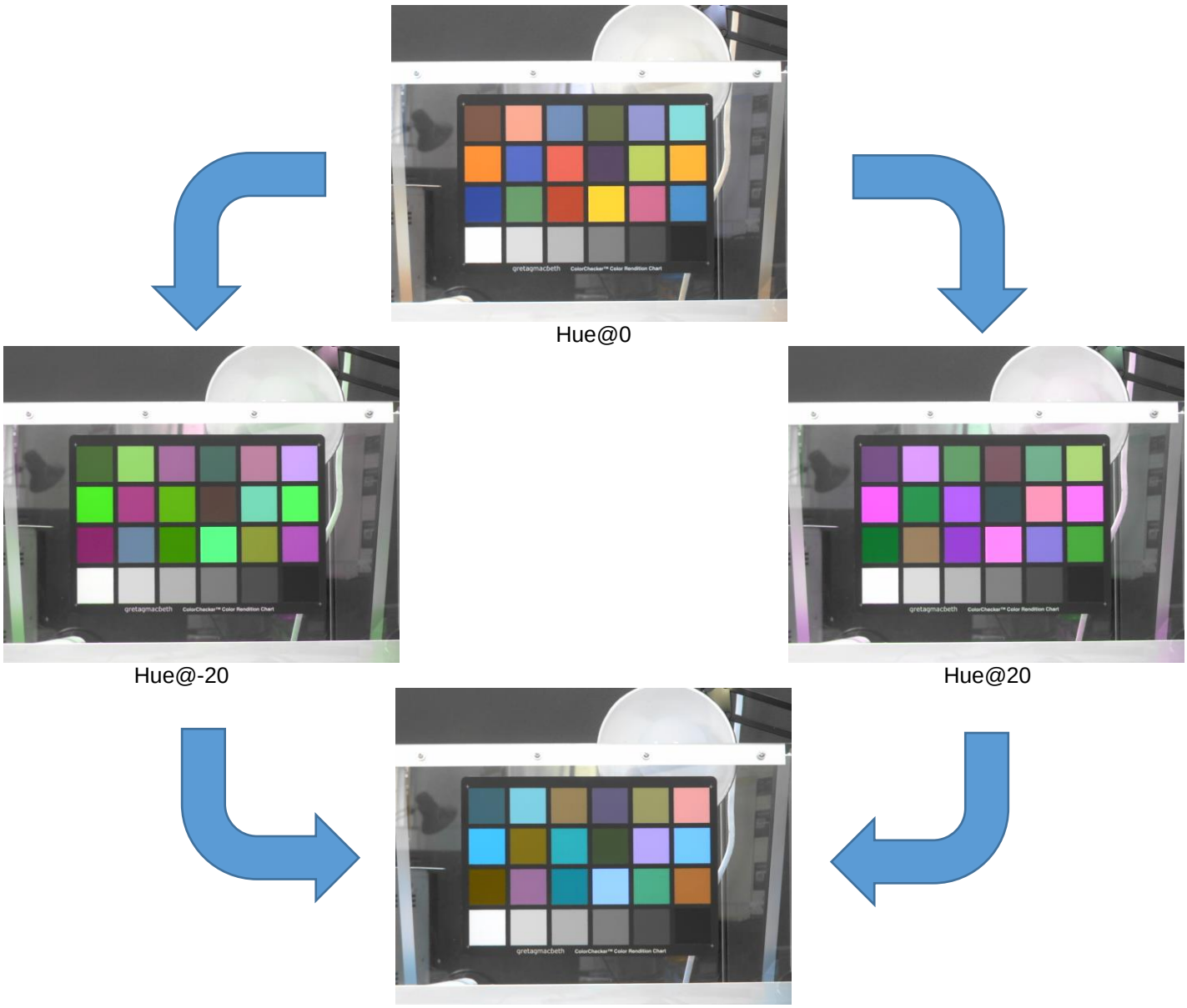

Contrast@0


Contrast@85


Contrast@255

3.2.3.Hue

The image Hue can be adjusted.
Default value is “0”. Adjustment is made between the range of -40 – 40.
The image will rotate through a Hue Circle as the value is changed. +40 and -40 will have the same Hue.



3.2.4.Saturation

Increase in this value increases the color saturation of the image.
Default value is “94”. Adjustment is made in the range of 0 – 255.


Saturation@0


Saturation@94


Saturation@255

3.2.5.Sharpness

Increase in this value will emphasize the edges of inside the image and increase the Sharpness.
Default value is “1”. Adjustment is made in the range of 0 – 4.

Sharpness@0

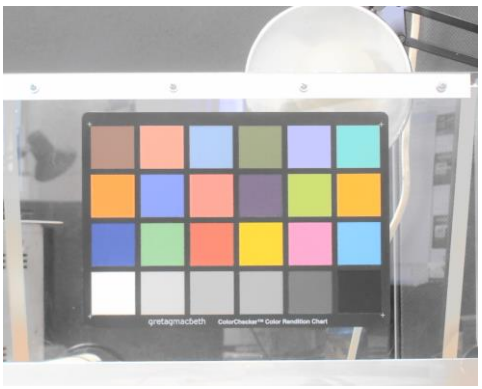
Sharpness@4

3.2.6.Gamma

The function is for the adjustment of the gradation characteristics curve of the image to compensate for the Gamma characteristics (image gradation response characteristics) of the display.
Default value is “100”. Adjustment is made in the range of 48 – 300.


Gamma@48


Gamma@100


Gamma@300

3.2.7.White Balance

The White Balance function is used to calibrate “white” color under varying color temperature lighting conditions.
Default setting is “auto”. The default value in manual adjustment mode is “4600”.
Adjustment is made between the range of 2800 – 6500.
The White Balance of the image will be optimally adjusted per the value selected for the particular color temperature environment.
When Auto is “ON”, the camera will automatically adjust the White Balance by judging the lighting conditions in the image being shot.


Auto White Balance


Manual White Balance@4600

3.2.8.Backlight Compensation

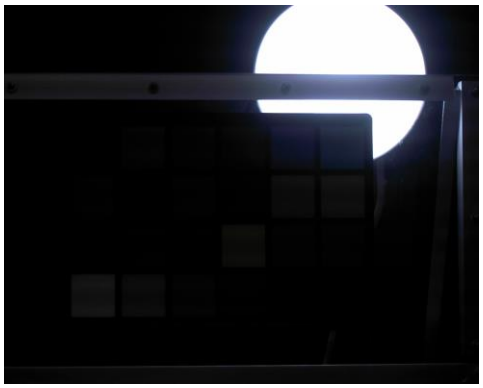
The Backlight Compensation function adjusts the exposure of the center of the image to compensate for the dark shadow created due to lighting from the back of the object.
”0” (Backlight Compensation OFF) or “1”(Backlight Compensation ON) can be selected. Default value is “0”.

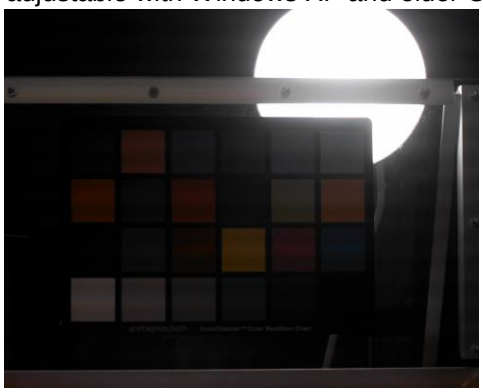
Backlight Compensation OFF

Backlight Compensation ON

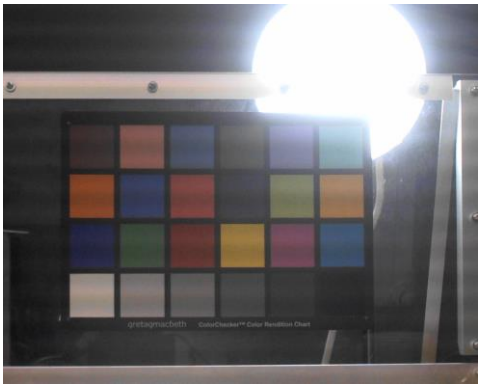
3.2.9.Gain

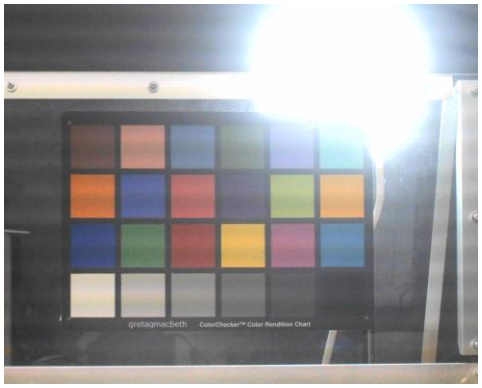
Higher the value set, the higher the gain (amplification) of the signal, which will increase the brightness of the image. However, the noise element of the image will also be amplified.
Default value is “0”. The setting is accessed by manually setting the Exposure in the Camera Control menu as described in the proceeding section of this manual. Adjustment is made in the range of 0 – 24 (dB).
※This function is not adjustable with Windows XP and older OS.


Gain@0


Gain@6


Gain@12


Gain@18


Gain@24

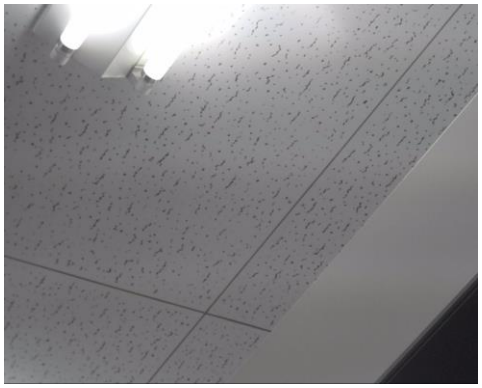
※Exposure fixed at “-8”

3.2.10.PowerLine Frequency(Anti Flicker)

Proper setting of this feature is used to compensate for flicker caused by environments such as lighting with fluorescent lighting.
Default is “50Hz”. Selection is made between either 50Hz or 60Hz.
Please select the frequency which matches the power mains frequency of the environment which the camera is used.
This function is active only when the Exposure function is set to Auto.

※This function is not available with Windows XP and older OS.

FlickerLess@50Hz



FlickerLess@60Hz

※The mains power frequency at the location of the captured images is 50Hz.

3.3.Video Capture Filter Camera Control

The settings related to shutter speed is adjusted from the Camera Control of the Video Capture Filter menu.
The settings window is accessed from the Options -> Video Capture Filter: Camera Control.

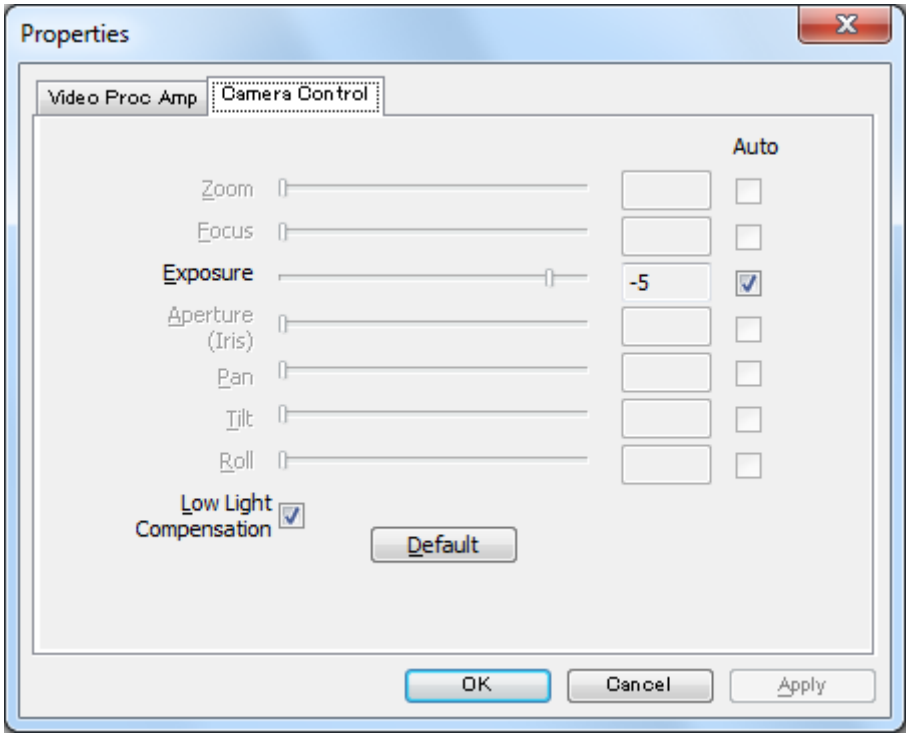


Fig.7 Video Capture Filter Camera Control window

The same setting is accessible from Panels->Camera Control.

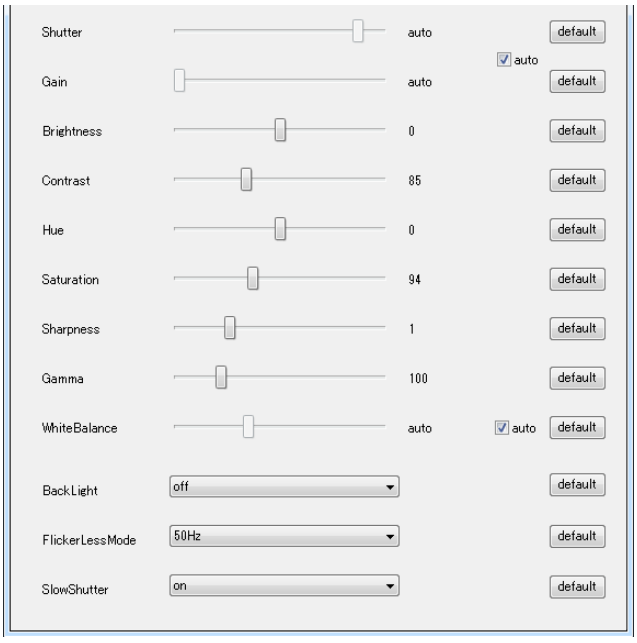
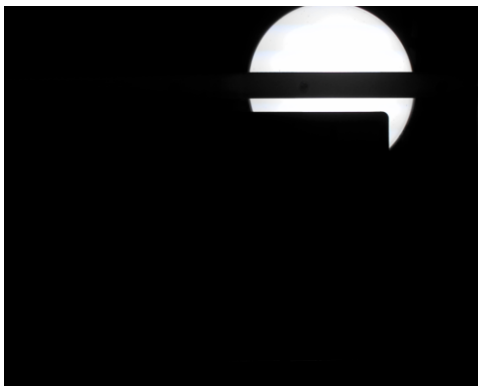


Fig.8 Camera Control window

3.3.1.Exposure(Shutter)

The shutter speed (in seconds) is calculated by 2^Exposure Value. Higher Exposure, image will be brighter.
Default is set to “Auto”. The default value for Manual control is “-7”. Adjustment is made in the range of -13 - -4 (1/8192 – 1/16 seconds).
If the Color Space/Compression and Image Size setting is set for 30fps modes, the frame rate will be reduced (approximately 15fps) at Exposure@-4.

Exposure@-13



Exposure @-10

Exposure @-7

Exposure @-4

3.3.2.Low Light Compensation(SlowShutter)

The default setting is ON (checked box). When Low Light Compensation is ON, the camera will decrease the shutter speed to increase sensitivity, if the camera judges that there is not enough illumination. In this mode, the frame rate will decrease.

※This function is not available with Windows XP and older OS.

4.GPIO Connection

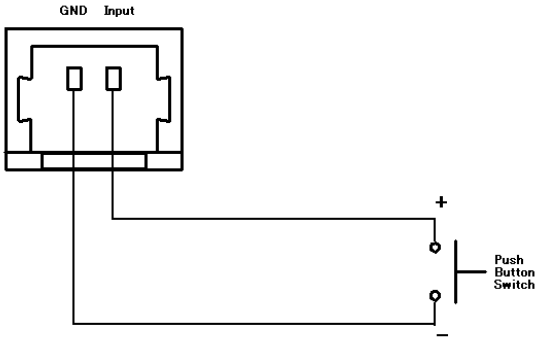
The WAT-01U2 has a 2 pin GPIO (General Purpose Input/Output) connector at the back of the camera. Currently, an external trigger for capturing Snapshot is assigned to this connection.

4.1.Snapshot Function

To use the GPIO Snapshot function, connect the 2 pin cable to the WAT-01U2 GPIO connector and use a push button switch (for example) as the trigger is recognized by closing of the circuit.

When the button is pressed (circuit is closed), the camera will stop video capture and switch to static image capture. A static image approximately 1 second after the button is pressed will be output. Thereafter, the camera will revert back to video capture.

From the time when the button is pressed until the Snapshot is output, the camera will adjust the exposure and white balance. During this time, if the environment changes, such as lighting conditions, a good Snapshot may not be captured.



4.1.1.Method to Confirm Operation(saving of static image)

The saving of the image file captured by the Snapshot function is done by using the WatecCameraViewer (available for download from our website : http://www.watec.co.jp/).

While the WatecCameraViewer is open, and the video image can be previewed, shorting the GPIO circuit will save a Snapshot to an image file (.jpg or .bmp).
(The image file will be saved in the same folder as where the WatecCameraViewer is operating)

The same Snapshot function can be operated from the WatecCameraViewer.
(Capture⇒Trigger for Still Capture)

※Please heed caution to the following when using the WatecCameraViewer in the Windows Vista/7/8 OS environments:

・When starting the program from C:¥ProgramFiles¥.. with UAC(User Account Control) enabled, make sure to start up the WatecCameraViewer with Administrator rights, as creating and saving of new files in this folder/directory tree is not permitted without Administrator rights. (Right Click on WatecCameraViewer executable file -> Run as administrator)

Please refer to the following section for setting of the image file to be saved.

4.1.2.Image File Setting

The image file format and size can be changed in the Options -> Still Capture Pin setting. (Next Page)

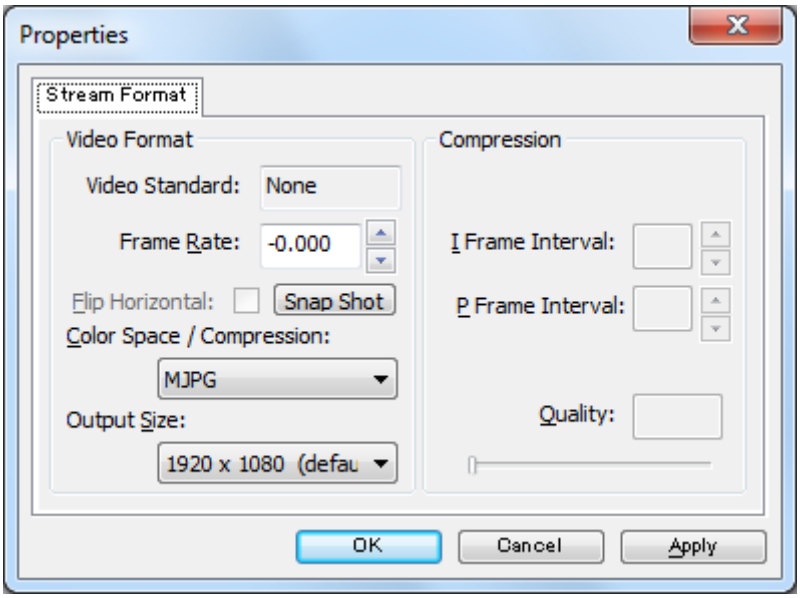


Fig.9 Still Capture Pin window

※The “Snap Shot” button in this menu is not active. Please trigger the Snapshot from the menu. (Capture -> Trigger for Still Capture)

※In Windows XP, the Still Capture Pin setting is fixed (MJPG, 1920x1080). (A window as shown below will appear, however the settings cannot be changed)

Fig.10 Still Capture Pin window(in Windows XP)

4.1.2.1.Color Space/Compression(CompressionMode)

Same as Video Capture Pin, select from YUY2 and MJPG.

YUY2: Snapshot image file is saved as .bmp file.

MJPG: Snapshot image file is saved as .jpg file.

※In Windows XP, MJPG(.jpg file) setting is fixed.

4.1.2.2.Output Size(ImageSize)

Same as Video Capture Pin, the following 8 selections are available.
Image file will be saved at the image size selected.

Image size (H x V)	Aspect Ratio	No. of Pixels	Typical Nomenclature
1920 × 1080	16 : 9	2,073,600	HD 1080p (Full-HD)
160 × 120	4 : 3	19,200	Quarter-Quarter-VGA
176 × 144	11 : 9	25,344	Quarter-CIF
320 × 240	4 : 3	76,800	Quarter-VGA
640 × 480	4 : 3	307,200	VGA(Video Graphics Array)
1280 × 1024	5 : 4	1,310,720	SXGA(Super-XGA)
1280 × 720	16 : 9	921,600	HD 720p
1280 × 800	16 : 10	1,024,000	WXGA(Wide-XGA)

※In Windows XP, the setting is fixed to 1920 x 1080.