PTZOptics Camera Settings Guide
Now includes Color Correction & Low Light Setup Guides

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The shutter speed, aperture and gain (ISO) are commonly referred to as the most important camera settings.

In the “Live Video Streaming Camera Settings Guide” we review the ideal camera settings for most cameras including aperture, shutter speed and gain along with a variety of advanced features. This guide is a comprehensive overview for users tuning cameras for conference spaces, production studios, live sports and even performances with low light. Tuning your camera for a proper exposure is key to effective live streaming because in many cases there is no post production. This is as true in a corporate webinar as it is for live streaming competitive sports. Enjoy this live streaming camera settings guide built to be an informative tutorial on the foundations of photography and video camera operation.
Always start with the proper frame rate, shutter speed, and aperture when setting up your camera...
Then you can adjust the advanced settings for optimal video picture...
Understand the 180 Degree Shutter Speed Angle Rule:

\[
\frac{1}{2X \text{ Frame Rate}}
\]
The 180 Degree Shutter Speed Angle Rule:

Most of the time you will be using either 30 or 60 frames-per-second (fps) and because of 180-degree shutter angle rule, which means that your shutter speed should be double your frame rate.

- At 30fps, your shutter speed should be 1/60
- At 60fps, your shutter speed should be 1/120.
PTZOptics cameras offer advanced features to optimize your exposure in almost any setting...
Getting your camera settings **perfect** is a requirement for **live video**... because there is usually no post-production options.
Lighting will be different in each of our four scenes. We will optimize based on our lighting and overall goals to achieve best exposure for our video production.
Exposure Settings

**Auto** - Fully automatic settings for shutter speed and aperture with ability to adjust gain, dynamic range, backlight and anti-flicker.

**Manual** - Full iris, shutter speed and range control

**SAE** - Shutter Automatic Exposure - The camera will measure light and automatically set the aperture based on your desired shutter speed.

**AAE** - Aperture Automatic Exposure - The camera will measure light and automatically set the shutter speed based on your desired iris opening (aperture).

**TIP:** Use SAE when you are looking for a specific shutter speed. When you have fast moving objects in your scene you may want to set a faster shutter speed. Use AAE when you want to lock in a depth of field effect from a specific aperture setting.
Aperture: The aperture also known as the f/stop controls the opening of the iris and therefore light on the sensor.

Tips

1. Use a large aperture (small f/stop number) for a shallow depth of field. A shallow depth of field is useful for close up subjects where you want the background to be out of focus.
2. Use a small aperture (large f-stop number) when you want a large depth of field. A large depth of field is useful for sporting events or large areas where you want everything in focus.

12X IRIS OPTIONS
Aperture / F-Stop:
F1.8, F2.0, F2.4, F2.8, F3.4, F4.0, F4.8, F5.6, F6.8, F8.0, F9.6, F11.0, Close (Effective only in Manual, AAE mode)

20X IRIS OPTIONS
Aperture / F-Stop:
Aperture value. Optional items: F1.8, F2.0, F2.4, F2.8, F3.4, F4.0, F4.8, F5.6, F6.8, F8.0, F9.6, F11.0, Close (Effective only in Manual, AAE mode)

* The aperture is the same for both models. The main difference is the field of view both wide angle and fully zoomed in.
**Shutter Speed:** The shutter speed supplies is the amount of time it takes the shutter to open and close each frame.

**Tips**

1. Use a fast shutter speed for scenes with a lot of movement such as Sports.
2. The faster your shutter speed is, the less light will make it through to your sensor. You will notice this when you adjust your frame rates because the picture will become brighter or darker depending on your speed.
3. Keep in mind that most motion pictures use 24fps with a shutter speed of 1/50. Most professional say this is the most natural setting.

A low shutter speed can make moving objects look blurry.

A fast shutter speed will make moving objects more clear. This is extremely important for slow-motion video.

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12x SHUTTER SPEED

1/30, 1/60, 1/90, 1/100, 1/125, 1/180, 1/250, 1/350, 1/500, 1/725, 1/1000, 1/1500, 1/2000, 1/3000, 1/4000, 1/6000, 1/10000 (Effective only in Manual, SAE mode)

20x SHUTTER SPEED

1/30, 1/60, 1/90, 1/100, 1/125, 1/180, 1/250, 1/350, 1/500, 1/725, 1/1000, 1/1500, 1/2000, 1/3000, 1/4000, 1/6000, 1/10000 (Effective only in Manual, SAE mode)

* The shutter speed options are the same for both models. The main difference is the field of view both wide angle and fully zoomed in.
Color Balance: The color balance of your image will change the colors (including black and white) rendered in your image.

Tips
1. Start with an auto-white balance. This can be found on the OSD (On Screen Display Menu). Zoom your camera into the white image and allow the camera to make the appropriate adjustments.
2. Use the Red & Blue gain/fine-tuning to remove any unwanted coloring from either colors.
3. Use Hue/Saturation for additional color tuning.

Color balancing is crucial for recording live video because there is no post production option. Many video production systems offer help with color balance but it’s still best practice to handle color and white balance in the camera. In low light situations consider using a color checker as seen here.

12x & 20x Color Options
- **WB-Mode:** AUTO, INDOOR, OUTDOOR, ONE PUSH (OK), MANUAL
- **Red Gain:** 0~255 (Effective only in Manual Mode)
- **Blue Gain:** 0~255 (Effective only in Manual Mode)
- **Red Gain Fine-Tuning:** -10~10 (Effective only in Auto, Indoor, Outdoor Mode)
- **Blue Gain Fine-Tuning:** Optional -10~10 (Effective only in Auto, Indoor, Outdoor Mode)
- **Saturation:** 60% ~ 200%
- **Hue:** Chroma Adjustment - 0 ~ 14
- **IR Filter:** 1 ~ 3
- **AWB Sens:** The White Balance Sensitivity Normal, High, Low.
**Contrast**: Contrast is what adds dimension to your images. Good contrast means your image has a full range of color tones.

**Tips**

1. Try setting the camera to black and white. This will make your job of measuring contrast easier because you only have to look for the most rich setting for lights and darks.
2. Consider the mood you are trying to convey. If you are looking for a light and fresh mood use a lighter gray area. If you are looking for a dramatic mood use darker settings.
3. If you are using a green screen with a chroma key try adjusting the contrast and hue.

**More Tips**

1. Luminance can help you brighten up and image but may wash out your image if used too much. Try reducing reliance on luminance and add naturally or professional lighting.
2. PTZOptics camera can be used to produce extremely sharp images. While full sharpness can helpful for certain applications, a softer sharpness setting can make the picture look more “natural.”
**Noise Reduction:** Noise is generally defined as aberrant pixels that are not representing the color or exposure properly generally due to low light.

**Tips**

1. 2D noise reduction settings is ideal for scenes with movement. The technology produces superior results for moving objects.
2. 3D noise reduction settings are ideal for static fields of view.
3. By using both 2D and 3D noise reduction together you can effectively enhance both moving and static imagery.

Image noise is extremely distracting to viewers and must be removed to achieve a broadcast quality image. Many PTZOptics users do not notice any image noise because they are shooting in a well lit environment. Image Noise is generally only noticed in low light scenes where the gain has been increased. The gain is usually increased to brighten an image where aperture and shutter speed have already been optimized. Using a mix of 2D and 3D noise cancellation is ideal for most live broadcast environments.

**More Tips**

1. Hot pixels (sometimes called stuck pixels) appear as brightly coloured spots in your images. They are often more noticeable with slow shutter speeds or high ISO settings. Given the location of these hot pixels, the D-Hotpixel feature can automatically remove them.

**12X & 20X Color Options**

- **2D Noise Reduction:** Off, AUTO, 1 ~ 5
- **3D Noise Reduction:** Off, 1 ~ 8
- **D-Hotpixel:** Off, 1 ~ 5
Tools you may need

Color Checker, Gray Card, White Balance Filter, Calibrated Monitor, Vectorscope, Waveform Monitor, Adobe Premiere...
Considerations:

1. Color matching and correcting is not a “1 click process”
2. It takes time
3. Colorist’s are hired by movie companies for one job only. Color correcting
4. Plan ahead for your shoots to give ample time to color match your cameras and footage in post production, so you’re not disappointed.
5. Different angles cameras might pick up a hairline light as something else.
6. Make sure you use reliable monitors. Not all monitors are built the same.
Workflow

Setup Camera  Configure  White Balance  Check Colors

Test  Color Match
Step by Step Process

1. Setup your lighting. Light the room and/or your subject.
2. Consider your basic camera settings such as Shutter Speed, Aperture and Gain… (More on Next Slide)
3. Place your White Balance / Gray Scale Card in the area your subjects will be and work on white balance first.
4. You can use a White Balance Filter and “One Push” to get a starting point for white balancing
5. Then place your color checker in the area your subject will be. Zoom your camera into the area.
6. Here you can start to tune more advanced settings such as Hue, Red/Blue Gain and contrast…
7. You can now start to use a Vectorscope and Waveform monitor to make sure your exposure is perfect (more in latest slides…
The waveform monitor is the counterpart for the vectorscope available to handle brightness and exposure. With a waveform monitor, you can easily see if your image is clipping at the top or if the blacks are getting crushed. The waveform monitor will allow camera operators the ability to adjust the image preferably in the camera first to ensure your image has a good exposure.

Using the waveform monitor to influence your camera settings adjustments, you want your camera’s image to be within the lines of your monitor. You can use vMix to make sure your video has perfect whites and blacks using the tools as needed.
A vectorscope is a tool that represents the color of your camera image. It's like an x and y graph representation of the color accuracy of your live video feed. At the top of a vectorscope you have red, toward the bottom you have cyan and there is also a green similar to what you have seen in color correction software.

The vectorscope graph allows you to see the balance of the colors coming from your live video camera. To accurately tune your camera you can put up a color chart in your space and zoom into it with your camera.

Vectorscope
Advice

One of the key things with color corrections is that most people try to all of the color correction and exposure inside the camera. Many times the highlights can be blown out before they even get into your video production software. Using a vectorscope and waveform monitor you can bring down the range of your camera to make sure that you are not clipping. These tools make sure that you are not crushing the blacks or overexposing the whites with the settings in your camera. The waveform monitor specifically allows users to stretch the exposure to the perfect white and black settings.
Camera Settings for a Conference Space

**Resolution:** 1920x1080p 30fps  
**Camera Aperture:** Automatic  
**Camera Shutter Speed:** Automatic  
**Camera Focus:** Automatic  
**Camera Control:** IR Remote
Camera Settings for a Production

Resolution: 1920x1080p 30-60fps

Camera Aperture: small such as 1.8

Camera Shutter Speed: Automatic

Camera Focus: Manual

Camera Control: IR Remote / Joystick

Other Settings: Contrast and Hue perfect for chroma key.
Camera Settings for Live Sports

**Resolution:** 1920x1080p 60fps

**Camera Aperture:** Large such as 1.8

**Camera Shutter Speed:** Fast 1/120 or more

**Camera Focus:** Manual ∞

**Camera Control:** Joystick w/ monitor

**Other Settings:** 60 fps ideal for post production and slow motion
Camera Settings for Low Light Performance

**Resolution:** 1920x1080p 30fps

**Camera Aperture:** small such as 1.8

**Camera Shutter Speed:** slow 1/120

**Camera Focus:** Manual ∞

**Camera Control:** Joystick w/ monitor

**Other Settings:** Contrast and Hue and Wide Dynamic Range
Camera Settings for Low Light
Live Streaming
What is a Flat Image?

Most people try to all of the color correction and exposure inside the camera. Many times the highlights can be blown out before they get into your video production software. Using a vectorscope and waveform monitor you can bring down the range of your camera to make sure that you are maximizing your video sensor and your video is not clipping. These tools make sure that you are not crushing the blacks or overexposing the whites with the settings in your camera.
Resolution: 1920x1080p 30fps

Camera Aperture: small such as 1.8

Camera Shutter Speed: slow 1/60

Gain: Adjust until image shows noise and dial back (0 ~ 15)

WDR: Adjust to improve lighting especially if backlighting is an issue
Low Light: Image Settings

**Luminance:** Adds additional light to image

**Contrast:** Make blacks darker and whites whiter until they realistic to the eye

**Tip:** Try using the PTZOptics IP Controller to easily adjust these settings on the fly.
Low Light: Noise Reduction

2D Noise Reduction: Ideal for scenes with a lot of movement.

3D Noise Reduction: Ideal for static fields of view.

Tip: Try using a combination of 2D & 3D Noise Reduction for best results
Download this checklist in PDF Format!

http://ptzoptics.com/landing/checklist.html
Need help getting started?

http://ptzoptics.com/landing/coupons.html
Check out our Live Channel as an Example...

http://youtube.com/c/ptzoptics/live
Sounds like ALOT of work?

Consider hiring a part-time or full time employee.

Learn more about hiring a “Chief Streaming Officer” here:

http://ptzoptics.com/landing/CSO.html
Download our FREE guide!

Step by step guide for setting up a live streaming channel!
Complete Live Streaming Start Up Guide!

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