

How to Adjust Lens for Good Video Quality

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Introduction

There are cameras that have one unchangeable lens with certain specifications. There are also cameras that allow changing lenses, so it is possible to use different lenses to those cameras. Since the lens is the most critical factor of the video quality, each lens type has to be studied and understood carefully in order to achieve the best possible video quality under given choice.

This article introduces the types of lenses and provides some simple procedures for adjusting lens.

Lens Types

- **Varifocal Lens**

A varifocal lens is a camera lens with variable focal length in which focus changes as focal length (and magnification) changes, as compared to parfocal (“true”) zoom lens, which remains in focus as the lens zooms (focal length and magnification change). Many so-called “zoom” lenses, particularly in the case of fixed lens cameras, are actually varifocal lenses. There are two types of varifocal lenses, with **Manual Iris** and with **Auto Iris**.

Manual Iris Lens is the simplest type of iris control lens with manual adjustment to set the iris opening in a fixed position. These are generally used for fixed lighting applications or where the camera to be used is readily accessible, and lighting level stays mostly constant.

The lens is outfitted with a ring on the body that can be turned to alter the aperture directly.

ACTi P/N	PLEN-0107	PLEN-0201	PLEN-0202
Size	1/3"	1/3"	1/3"
Type	Normal	Normal	IR
Aperture (F)	1.4	1.2	1.6
Focal Length (f)	3.5 ~ 8	2.4 ~ 6	2.8 ~ 12
View Angle (Horizontal)	106 ~ 43.2	111.3 ~ 47.1	102.2 ~ 23.7

Auto Iris is a type of lens that can be electronically controlled. This type of lens allows changing iris size to adapt to different light levels. It is most useful where the light condition varies continuously. Auto iris lens allows the camera to adjust itself and get the best picture whatever the lighting conditions.

ACTi P/N	PLEN-0103	PLEN-0104	PLEN-0105	PLEN-0106	PLEN-0203	PLEN-0204	PLEN-0205
Size	1/3"	1/3"	1/3"	1/3"	1/3"	1/3"	1/2"
Type	Normal	Normal	IR	IR	IR	IR	IR
Aperture (F)	1.0	1.4	1.0	1.3	1.3	1	1.6
Focal Length (f)	3.0 ~ 8	5.0 ~ 55	3.0 ~ 8.5	7.5 ~ 50	2.8 ~ 12	2.9 ~ 8.2	8 ~ 80
View Angle (Horizontal)	36.8 ~ 94.3	61 ~ 5	94.2 ~ 33.5	90.5 ~ 33.6	102.2 ~ 23.7	95 ~ 35.6	46.6 ~ 4.7

- **Fixed-Focal Lens**

A lens with fixed focal length (Prime Lens) is less versatile than a zoom lens. Yet at the same focal length, fixed focal lens is often of superior optical quality, lighter weight, smaller bulk and lower cost. In comparison with a zoom lens, a prime lens has fewer moving parts and is optimized for one particular focal length. With a less complicated lens formula they suffer from fewer problems related to chromatic aberration.

ACTi P/N	PLEN-0101	PLEN-0102	PLEN-0108	PLEN-0109	PLEN-0110	PLEN-0111	PLEN-0112
Size	1/3"	1/3"	1/3"	1/3"	1/3"	1/3"	1/3"
Type	IR	IR	IR	IR	IR	Normal	Normal
Aperture (F)	1.8	1.8	1.8	1.8	1.8	2	2
Focal Length (f)	4.2	8	3.6	6	12	2.4	2.4
View Angle (Horizontal)	75	40	85	50	25	116	116

Focal Length and Iris

- **Focal Length (f)**

W ↔ **T** Is shown on the focal length adjustment ring on the lens (Wide ↔ Tele).

Here's an example on how focal length affects angle of view. The photos below are taken by a camera at a constant distance from the object under three focal lengths (20/35/50 mm). Wide/Tele are also referred to as Zoom out / Zoom in.



- **Iris (F)**

C ↔ **O** Is shown on the Iris tuning ring on the lens (Close ↔ Open).

These photos demonstrate the effect of Iris size upon intensity of light, image noise level and depth of field.

Iris Close ←————→ **Iris Open**

Intensity of light (Below pictures under 10000 lux)



Noise (Below pictures under 500 lux)



DOF (Depth of Field) (Below pictures under 10000 lux)



F11 ←————→ **F1.0**

- **Focus Distance**

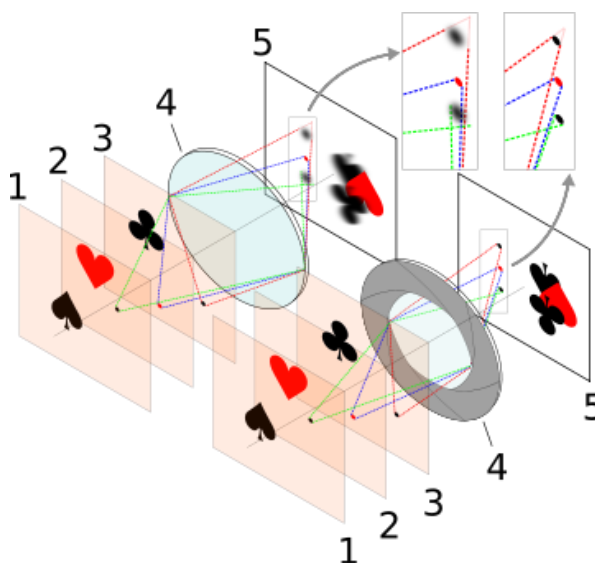
∞ ↔ **N** Is shown on the focal distance ring on the lens. (Infinity ↔ Near).

How to Adjust Lens for Good Video Quality

- **Steps to adjust the varifocal lens (Manual Iris)**

1. Open iris (C < > O) to the maximum possible.
2. Zoom (W < > T) to the desired view angle of your target scene.
3. Adjust the focus (∞ < > N) for the image to look sharp. Only objects near your focal plane will look sharp now. This is normal and we'll improve upon that.
4. Close iris.
5. Open iris slowly, adjust the iris from minimum until no noise exists.

At this moment, the video image has the longest depth of field (Deep Focus) with sufficient lighting. If you tune your iris larger, your video image will have a shallow focus with small Depth of Field. Please note that if your scene will go much darker then at the time you set the iris, you may need to open the iris further to compensate for low light. Please refer to the diagram to the right for relationship between Iris and Depth of Field.



6. Done.

- **Steps to adjust varifocal lens (Auto Iris)**

1. Zoom to the desired viewing angle of your target scene.
2. Adjust the focus for the sharpest possible image.
3. Done. (Iris size will automatically adjust to incoming light)

- **Steps to adjust fixed-focal length lens.**

1. Adjust the focus for the sharpest possible image.
2. Done.