



EDR Extreme Dynamic Range™

What is it, and why do I need it?

If you go through our Phantom camera descriptions and specifications, you will soon come across our feature termed “EDR,” or Extreme Dynamic Range.

What is this EDR and how does it apply to a Phantom camera user?

You may have heard, or even used the old photographic analogy “just like shooting a black cat in a coal mine” when describing a difficult photo subject. Now try to imagine that same cat holding a flashlight, and you want to record at least some kind of detail in the cat and also the reflector of the illuminated flashlight. A very difficult challenge at best!

The greatly reduced images displayed above will help illustrate the results of using the EDR function.

The image on the left has been determined to be the best exposure for recording this particular subject, but it is a compromise between light and dark like most high contrast subjects are. No EDR is used.

During the next test, the image on the right, EDR has been activated. Notice the increased visible information in the flame and plasma area, while details in the darker parts of the scene have been retained. In the full resolution images, very good detail can also be observed even in the nozzle segments on the outer side of the combustion area.

This is what EDR does, and it doesn't just apply to self illuminating or explosive events. Any subject that varies greatly in brightness levels can benefit from this feature, color or monochrome.

How Does It Work?

EDR stands for “Extreme Dynamic Range”. Our EDR function can supply you with a method to greatly increase your ability of getting that difficult shot.

It is a capability of Phantom cameras first pioneered and introduced by Vision Research. If you are shooting an event that has high contrast, you may need to adjust the camera exposure (lens aperture and exposure time) such that you can see details in the dark part of the image. However, this may mean that the light/bright parts of the image are overexposed and become saturated.

The EDR features give you two exposure times for a single frame. Here is how it works at a high level:

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Assume your camera is set up for a 100 microsecond exposure (exp), and EDR is set to 25 microseconds (edr). At a certain time during the frame exposure (calculated as exp-edr) the camera will reset all pixels that are above a pre-set threshold back to that threshold and then allow all pixels to continue being exposed. This pre-set threshold is set at the factory to a level that is about midway between black and saturation.

It is kind of like putting a brake on those pixels that are charging so fast they are destined to become saturated before the exposure time expires. It makes them back up a little, and then keep going. This means those pixels are likely not to saturate and the details in the “whites” of the image will be as good as those in the “blacks”.

Optimum EDR settings usually require some experimentation but are usually between 1/2 and 1/10 of the exposure. Settings larger than this will not have much effect.

EDR works on most Phantom cameras. Exceptions are the cameras with a progressive shutter (Phantom HD & Phantom 65) and the Miro 1 – where it is turned off.

EDR will not work correctly if the exposure is set to the maximum allowed exposure for a particular frame rate setting. However, by decreasing the exposure some (1 microsecond will do the trick), EDR will work properly.

HOW TO SPECIFY AN EDR EXPOSURE SETTING

1. Start the Phantom Control Software application
2. Open the Acquisition pull-down menu
3. Select the Setup and Recording... command from the Acquisition menu
4. Specifying an EDR Exposure Setting
 - a. Click the down arrow to display a drop down list box and select a preset value from the list.
 - b. Optionally you can enter any number in increments of 1 from the minimum to maximum value displayed in the list box. These values can be in 1µs increments, or percentage.
 - c. Click the Update button.

NOTES/ALERTS

Note:

EDR Exposure times should be set at approximately 1/2 of the Exposure time as a starting point. By setting the EDR Exposure to 1/2 of the Exposure time the brightest pixels in the images will be exposed for one stop less than the darker pixels.

When selected the Auto exposure feature will be disabled.

Focused

Since 1950, Vision Research has been shooting, designing, and manufacturing high-speed cameras. Our single focus is to invent, build, and support the most advanced cameras possible.

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