



STEP-BY-STEP GUIDE TO CALCULATE A CAMERA'S DYNAMIC RANGE

PREPARATION:

If you don't already have a grey card, please download our printable version from the same page you downloaded this guide from.

We are going to take a series of photos of the grey card at different exposures and it is essential that the light is constant throughout the exercise, so don't do this on a day when the sun is going in and out of cloud, or the light is changing in any other kind of way. It will only take about a minute to take all the photos you need, so just ensure that you start the first exposure at a time when you know the light will be constant for the following 60 seconds or so. If the light does change half way through, you'll need to stop and start over again.

You ideally want to have a lens of around 100mm, but as long as you avoid anything wider than 50mm or longer than 200mm then you should be okay. You basically want to be able to mostly fill the frame with the grey card without getting close enough to block some of the light illuminating it.

Place the grey card somewhere where it is not going to move and position your camera on a tripod so that it remains fixed. Make sure your tripod (or yourself) is not casting a shadow onto the grey card. Compose the frame so the camera is looking at a right angle onto the grey card to avoid any glare.

Manually focus on the card. We've kept the centre marks of the Photography Online logo in full contrast to allow easier focusing. Make sure you turn off auto focus so that the camera doesn't try to refocus between shots.

Finally you want to make sure your camera is in Manual shooting mode. This will not work in any other mode! You also want to make sure you are shooting in RAW. You can do this exercise in jpeg, but you will find that the dynamic range will be less.

Set your Exposure Time to 1/60th of a second and set your ISO to its native setting - which is the lowest it will go without going into an extended setting. This is ISO 100 for most cameras, but maybe as low as 64 or as high as 200. Now alter your aperture until your camera's exposure meter displays zero in the middle of the scale. If you are unable to achieve this then move to a brighter or darker environment accordingly. Outdoors in the shade, or indoors close to a large window on a bright day should provide the perfect amount of luminance.

As long as your camera's meter shows 0 on its exposure meter, the shot will record the grey card as a mid tone - exactly half way between black and white.

- **Step 01** - take a photo at 1/60th - ensuring that the camera's exposure meter is displaying 0. If it is not, then adjust the aperture accordingly. It's really important that from now on, your Aperture and your ISO remain constant, which is why we need to be in Manual mode. Make sure your camera is NOT set to auto ISO!
- **Step 02** - quickly check the histogram to make sure that the bulk of the graph is in the centre, as this indicates that you have done everything correctly.
- **Step 03** - now take 6 more photos in quick succession at the following times - 1/125th, 1/250th, 1/500th, 1/1000th, 1/2000th, 1/4000th. You can do an extra one at 1/8000 if you think your camera will have more than 12 stops of dynamic range.

What we have just done is taken a series of photos at 1 stop intervals covering the range from a mid tone (our 60 second shot) to a pure black. Now we need to take another series of shots to cover the other half of the range from a mid tone up to pure white.

- **Step 04** - Take a further 6 photos at 1/30th, 1/15th, 1/8th, 1/4", 1/2", and 1"

You should now have a series of photos, from pure black to pure white, all with a stop of exposure between them.

- **Step 05** - Transfer these photos onto your computer and label them so they appear in sequential order from the darkest to the brightest.....

For example, rename the 1/4000th image as "01-4000", label the 1/2000 as "02-2000", label 1/1000 as "03-1000", until you get to 1" which should be labelled as 13-1.

Now import these 13 photos into Photoshop or other image editor. They should automatically appear in the correct order, from the darkest on the left to the brightest on the right. If they are not in this order, please reorder them accordingly simply by dragging the tabs at the top.

Most photo editing software has a tonal scale of 1-255, with 1 being pure black and 255 being pure white. Activate the info tab in the "window" menu.

- **Step 06** - Now place the cursor over the centre of the 1/60th image and look at the Red Green and Blue readings in the Info display. These are known RGB values. If your camera has recorded a pure mid tone (which it should have done) then your RGB values should all be around 127. However, it is very unlikely that your camera will have achieved a perfect mid tone, so anything between about 120 and 135 will be good enough. If one colour is much higher or lower in value than the others, this means you have a colour cast. You should reshoot the images with a neutral colour balance (refer to your camera's manual to find out how to set a custom white balance using the grey card..

Assuming your RGB values are fairly similar and are within the range of around 120 - 135, then go to the next brightest shot - your 1/30th and check the RGB values. They should now be higher. Keep taking readings from each photo until your RGB values go above 250. This is essentially now a pure white. If you continue to sample any further highlight images, you will see that they don't actually get any brighter on

the screen because you have essentially reached the upper limit of the range of your camera - pure white. Obviously you cannot make anything brighter than pure white, so any detail brighter than the grey card will be outside the camera's range and will not be recorded. Delete any photos which display an average RGB value of more than 250.

- **Step 07** - Now do the same for the photos which are darker than your mid tone. So start with your 1/125th shot, then your 1/250th shot, and keep going down until your RGB values all read less than 5. You've now essentially hit pure black. Any further photos will not get darker even though they are at a lower exposure, so these can be deleted as they are outside the useful range of your camera.

Now count the number of images you are left with, and this number is the usable dynamic range of your camera.

Make a note of how many stops below your midtone (1/60th) your camera can go, and how many above a mid tone it can record detail at, as this will come in very handy next time you are out taking photos where you want to maximise the detail you can capture with your camera. If you increase the exposure in your editing software of your darkest remaining image (which will look totally black) you should see the Photography Online logo reappear, although the image will probably be very noisy. Now go to the brightest remaining image and reduce the exposure and you should see the Photography Online logo reappear, although it may be very subtle.

If you cannot recover the logo on either of the extreme shots, then it means these are probably outside the range of your camera to record detail.