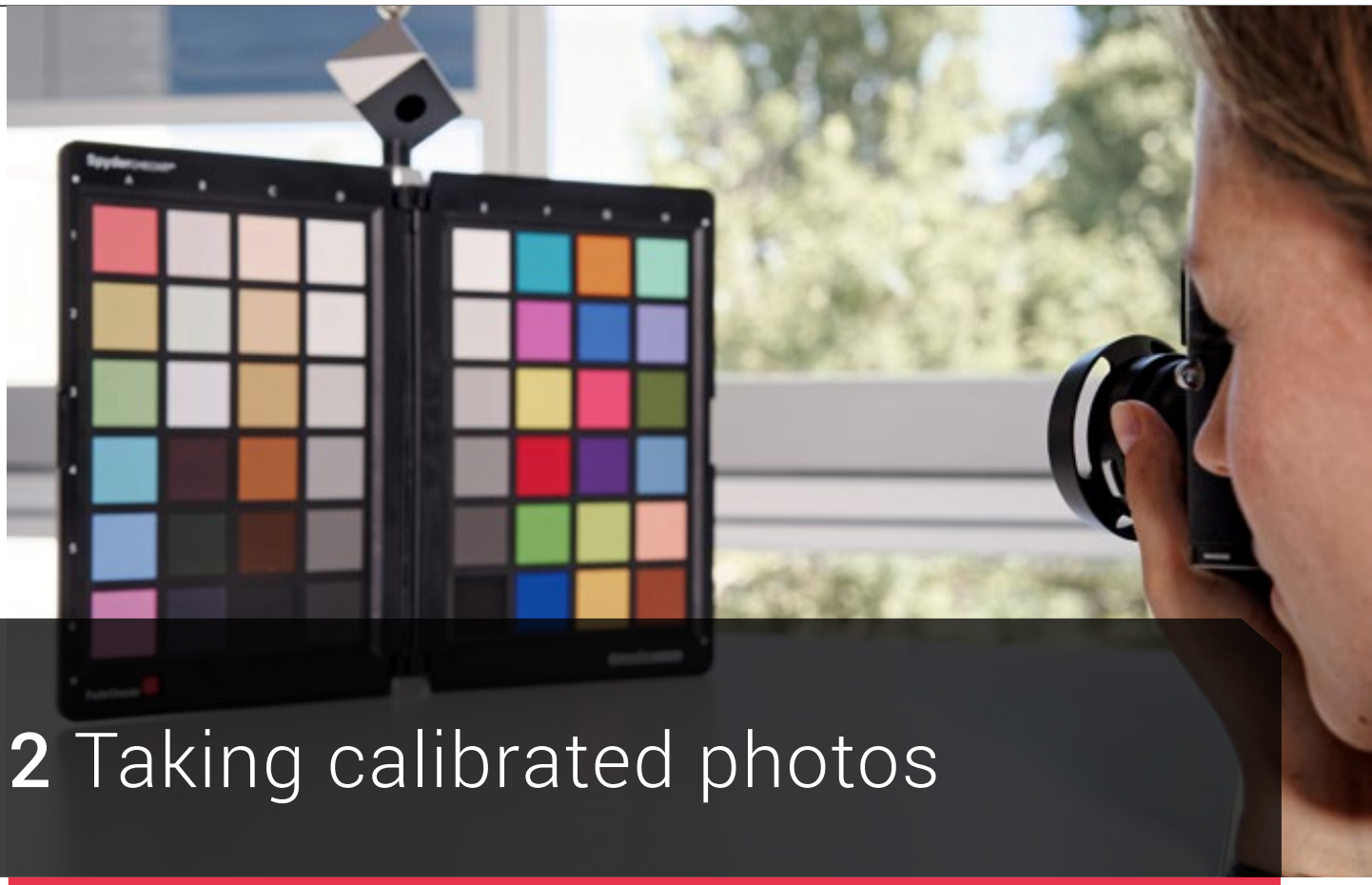

2 Taking calibrated photos

Camera calibration - the first step in your color workflow

- Which tools are available for calibration
- How to obtain evenly-balanced contrast with the SpyderCUBE
- SpyderCHECKR and how it provides color balance
- How to get razor sharp autofocus using SpyderLENSCAL

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Calibrating Your Camera

Why should photographers use color correction settings on cameras?

Color management starts with the exposure. How you manage your color profiles depends on how you process your files. If you're only shooting casually and look at your images on a display, you may not notice color deviations from the original view. Furthermore, the creation of profiles and color settings can be time consuming and requires additional hardware.

Nevertheless, camera calibration is not just for creatives or photographers with no time constraints. The importance of camera calibration increases with the degree of engagement in photography, regardless of whether or not photography is your profession. It is important for all photographers to consider that every digital camera model suffers from its own color "fix quotation lack of vision."

This can be both good and bad. Some amateurs appreciate it when the colors in an image appear stronger than they do in reality, because the image might be perceived as stronger and brighter. For many professionals and dedicated photographers, however, bright pictures can be a nightmare. Their goal is to neutralize colors in the image from the beginning. If the image is ultimately meant to be unrealistically colorful, then it is recommended to adjust it in post production in Photoshop or Lightroom.

Why working with a calibrated camera is worth it

Camera profiles are always used when it comes to absolute color integrity. The range of application extends from portraits to catalogue, fashion and product photography, among many others. However, amateur photographers, who not only take pictures for fun but also edit pictures to create high-quality prints or photobooks, should create profiles. A calibrated camera is the first link in the chain of an optimized color workflow.

Each camera has its own way of interpreting colors related to lack of vision. This is not a linear "color error," which can be eliminated with a moderate correction of a color channel. For example, a camera produces an accurate image of a green plant, but the skin tones within the image are too pink. A linear correction in this case would provide correct skin tones, but with the same setting, the green plants look unnatural.

In addition, there is the possibility that the same image, in a different lighting mood, is no longer correctly interpreted by the camera. In order to achieve maximum color accuracy, you should plan to calibrate your camera at each shooting session. Alternatively, you can create a set of profiles or color correction settings for individual lighting presets in advance, depending on the lighting mood of the shot. Be aware that with this approach, one can only achieve a specific result. Photographers should keep in mind that there are infinite lighting conditions which can't be covered with a set of pre-prepared color correction settings.

EXPERT KNOWLEDGE

Adjustment of different camera systems

An important point, which is often forgotten, is the possibility to color correct multiple cameras or camera systems with a color chart like the SpyderCHECKR. Professional photographers are often tasked with capturing "Behind the Scenes" photos, and sometimes several photographers will work together on an event. Different systems and camera models will likely be used in these cases.
Here one can simplify the digital post-processing considerably and save time and money if all the cameras are color corrected with the SpyderCHECKR.

INFO

No matter how many cameras are used on a shoot, color harmony is important to help tell a cohesive visual story. Read how SpyderCHECKR and SpyderCHECKR 24 can help make this process easy and precise.

More Info >

DOWNLOAD INFORMATION

We have provided a RAW image for you with a model that holds a SpyderCUBE and a SpyderCHECKR in her hands. This allows you to test how to optimize your images with just a few clicks.

Download >

Contrast balance

Using tools is worthwhile

One of the most important aspects of a technically good picture is a balanced ratio of the contrast range. It is not enough for the camera to capture all of the colors, the camera needs to determine the optimum black and white point, as well as the neutral grey within a lighting situation. However, since the reference colors, i.e. the reference points, are usually missing in a scene, almost all cameras have shortcomings in this area. There are tools for neutralization on the market, but what is the best way to use them?

How to ascertain neutral grey with a reference

The eyedroppers in the Photoshop “tonal adjustment” and “gradation curves” dialogues can be a starting point. RAW converters are missing this tool. Ideally you will use these measuring tools to click on a neutral tone like black, white, or 50% grey and a color cast will be eliminated. The main problem is finding an area in the image that contains the neutral tone. Metallic surfaces work well for this. However, they often have a tendency to be blue-toned. Grey articles of clothing are said to be far from neutral grey due to the whitening agents used in laundry detergent.

Neutral grey is hard to find in this image. Datacolor Photo Contest Winter 2017, ©Jose Lopez

In short, it is almost impossible to find a grey tone in a picture that can be used as a reference value. You get a maximum approximation, but never an exact result.

A true neutral grey can only be guaranteed by using a standardized grey card --Many professionals work with grey cards or light trap cubes like the SpyderCUBE from Datacolor. The adjustment for an identically lit image series is made with the help of Photoshop CS2 directly in Adobe Camera Raw dialogue and applies the settings to all other opened pictures. In principle, it is sufficient to use the grey card in one shot of a photo series under the same lighting conditions.

EXPERT KNOWLEDGE

Perhaps you have already asked yourself what is so special about the color grey that it always comes up in photography. The answer is quite simple: the color grey is neutral. It is immediately apparent what end of the spectrum a color tint is in. In practice, a grey based on a metamorphic color is used so that a uniform reflection behavior is ensured independently of the light temperature. Since many know that the color is neutral grey, it means that in the additive color world the colors RGB have to be equaled. These corrections can be done with the eyedropper tool in Photoshop. The same is true in the CMYK color space.

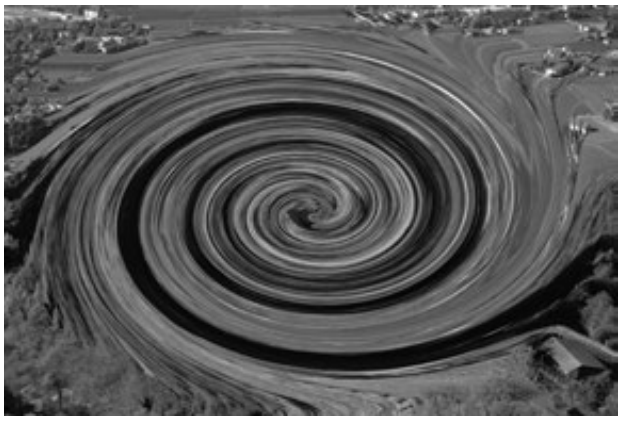
Excursion in 18% Grey

When we measure light we measure light intensities and not colors. This means that depending on the intensity of the light, we move between black and white, with the grey gradations in between. An 18% grey corresponds to the average brightness distribution. The light is measured integrally in this case. Imagine you take an average black / white motive and stir the black / white values and their gradations freely. The result is a 18% grey. The exposure measurement in a camera uses this value as a reference since it corresponds to most image motives. Deviations from a standard motive, such as a person in front of a snowscape, need to be corrected since the white portion predominates and the motive in the middle (integral) does not correspond to 18% grey. The image deviates from the standard, and without a correction of the measured time / aperture combination, the snow would turn grey and the face of the person too dark.

As a result, the exposure is corrected accordingly and a longer exposure time is applied or the aperture is opened by approximately two f-stops. Alternatively, you can use an exposure measurement method such as spot measurement, which has a much smaller measuring field and you can measure the exposure in the image areas more accurately.

Average color motive

How the exposure measurement system is seeing the motive



stiring the black / white values

leads to an 18% grey

Adjust the contrast balance using the SpyderCUBE

How to obtain all references in one image

The SpyderCUBE is unique since it differs from a conventional grey card elementally and is equipped with an additional light trap and a chrome ball. The definition of the contrast range can be carried out precisely, as is not possible with a pure reflection chart. The SpyderCUBE captures the color temperature and light source data for accurate color matching.

The features in detail:

- Two neutral 18% grey surfaces
- Two white surfaces
- One black surface
- A light trap (black hole)
- A chrome ball
- Information about the light setting

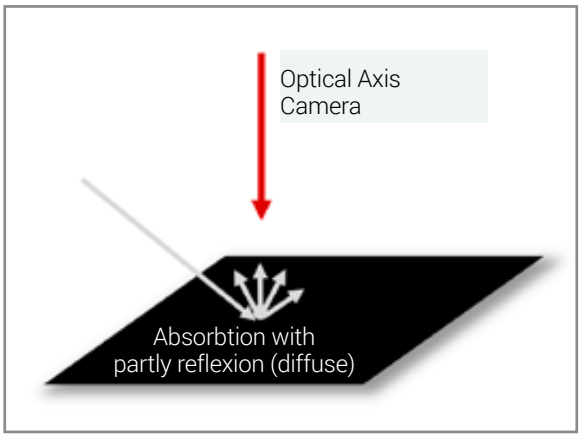
The light trap consists of a hole inside the cube. Penetrating light is "swallowed." Nearly no light is emitted, resulting in a very high black level. Using the black surface, structures can be controlled in the shade. With the chrome ball in turn, a spot light can be captured in the scene due to its excellent reflection behavior. The white areas, on the other hand, serve to determine the white value where structures are still to be seen.

The picture clearly shows all four surfaces, the light trap and the chrome ball. A further advantage of the SpyderCUBE is the possibility to obtain information about the light setting, since the two grey areas have different brightness, depending on the light setting.

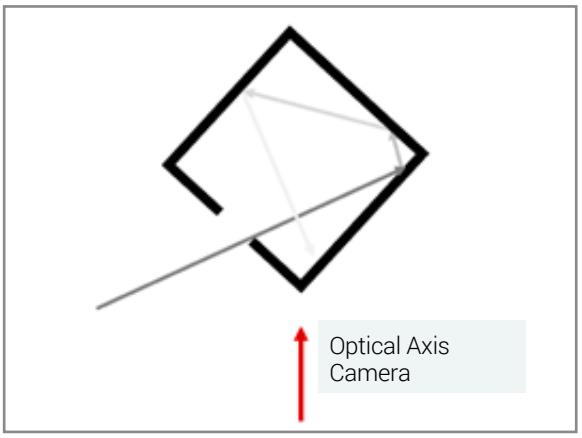
INFO

You can use the SpyderCUBE for both RAW and JPEG files. For JPEG files, you should be aware that any image change in this format always involves loss of data.

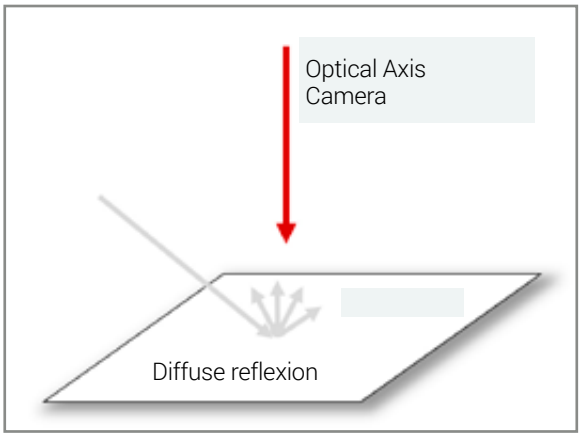
Physical characteristics of the different surfaces:



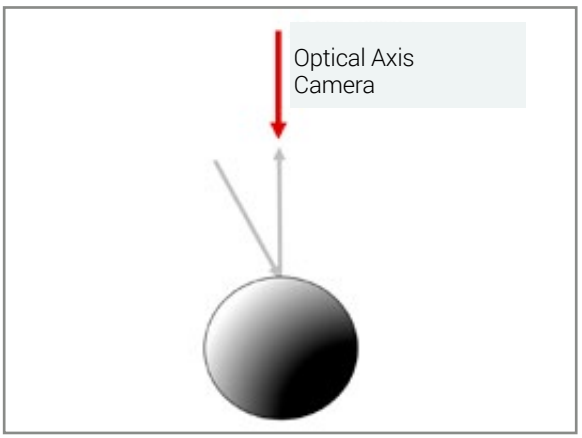
A black matte surface, as used in a grey card, absorbs most of the visible spectrum. However, a small part is diffusely reflected and radiates in the direction of the camera, which leads to a dark grey but never to absolute black. The black surface of a grey card (equivalent of the black surfaces of the SpyderCUBE) is used to determine the black value in structures that are unseen.



If a light beam is caught in the light trap of the SpyderCUBE, it becomes weaker with every reflection on the inner surfaces of the cube. The likelihood of a light beam being emitted in the direction of the camera is nearly zero. This allows you to measure maximum black.



The white surface of a grey card is intended to reflect as much light as possible and is used for the definition of the white value in which structures are still present. It is not intended to define spotlights.

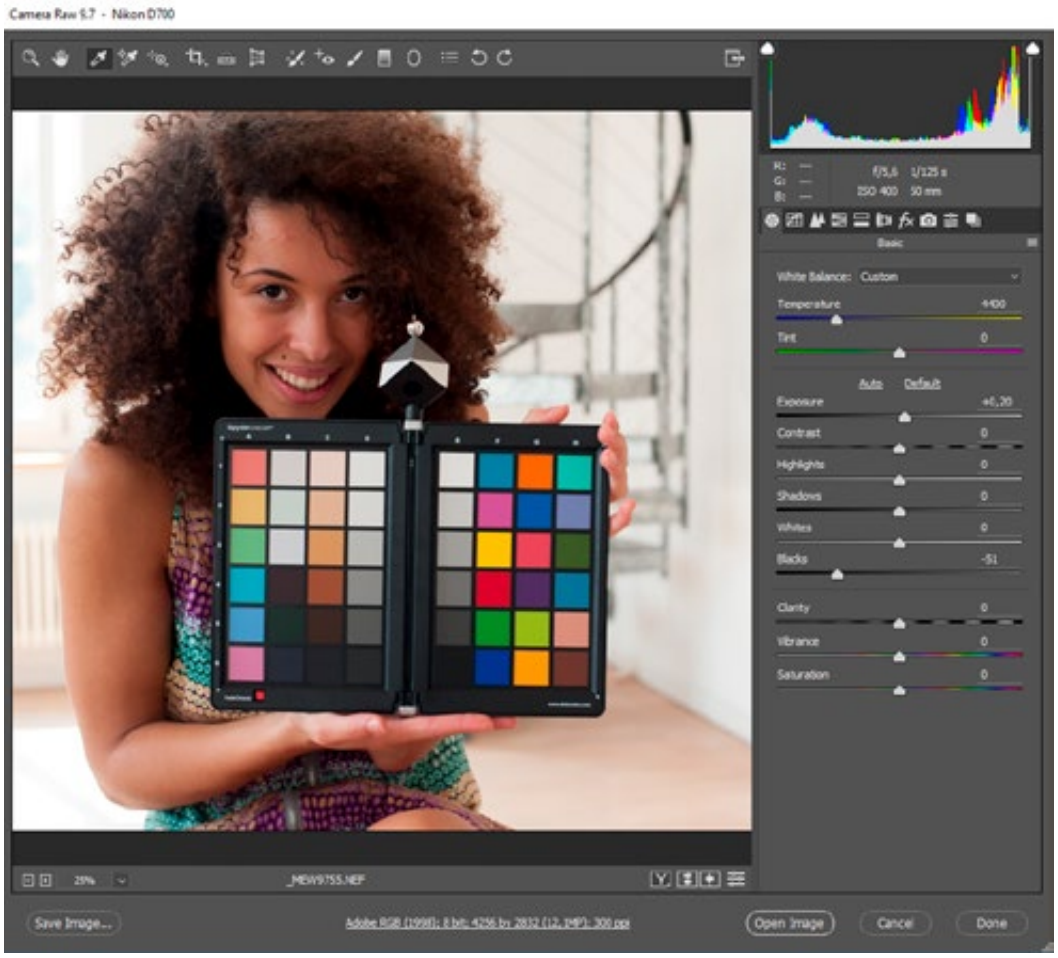


If the light falls on a chrome ball, the light is reflected toward the camera without appreciable losses. We receive a spotlight in which no additional structures are available.

Using SpyderCUBE

One picture per setting is enough

The SpyderCUBE should be positioned in the picture so that it's visibly discernible. Make sure that the black hole ("light trap") on the front side of the measuring cube is angled toward the camera. The white surface and the two grey surfaces should also be easy to see. Now all you have to do is take a picture of the SpyderCUBE and you will be able to analyze the lighting of the moment with a reference later. After this shot, remove the SpyderCUBE from the image set and begin shooting the subject as planned. It will only be necessary to use the SpyderCUBE again if the lights or lighting conditions change.

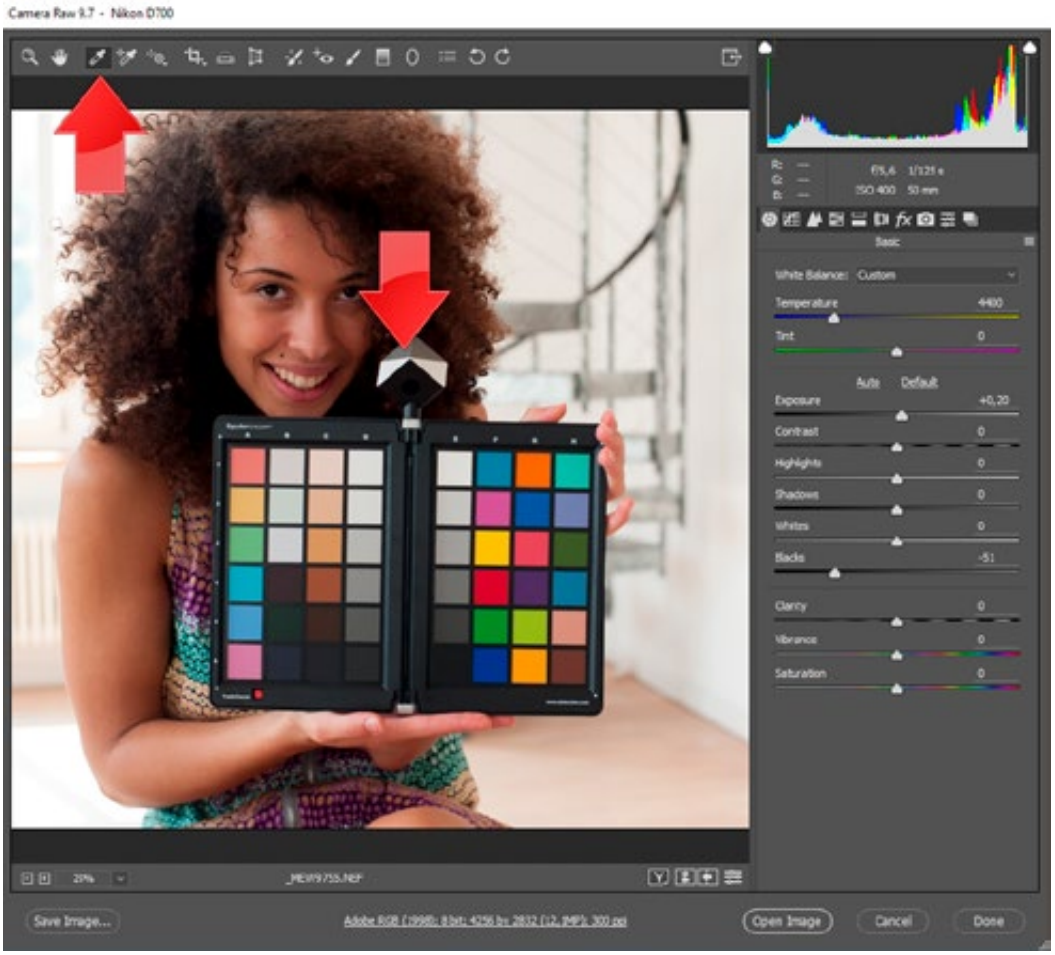


To adjust the contrast range, white balance, and grey balance, load the SpyderCUBE image in Photoshop, Lightroom, or a RAW converter.

White balance

How to activate manual white balance

In Lightroom, as well as in the Photoshop Camera Raw dialogue, you will find a “white balance” tool which can be activated for manual white balance. Move it onto the lighter of the two grey surfaces, in case different luminosities from your lighting appeared on both surfaces. The lighter grey surface will reflect your main light source. Redefine the color temperature and color tone with one click. The extent to which this needs to be adjusted can be seen on the corresponding adjusters.

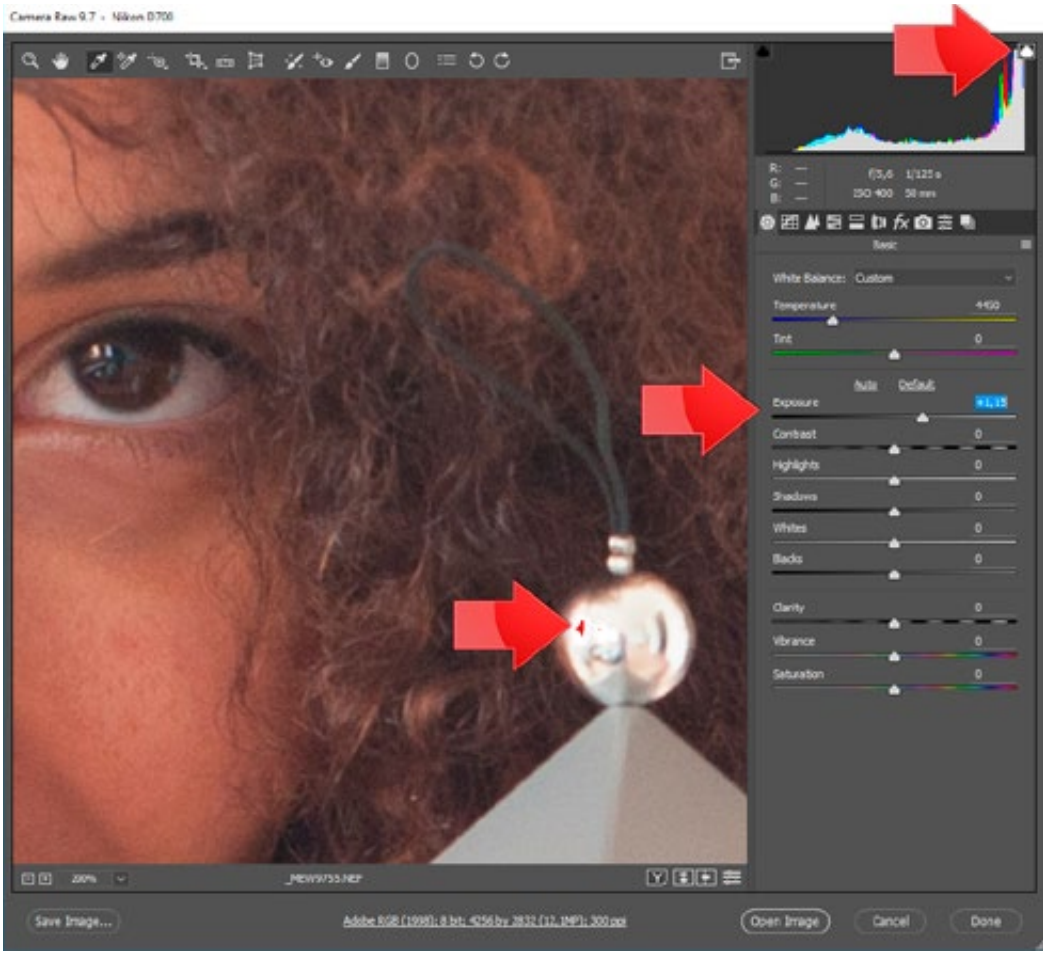


With a click of the eyedropper tool, the color tune of the image changes immediately.

Brightness

Optimally adjust your brightness

Take a look at the histogram display: adjust the lighting using the slide control so that no color channels in the light or shadows are cut off. Keep the SpyderCUBE within eyesight. If the lights erode or the shadows run due to changes in the exposure, you can correct these effects using the brightness control.



An excellent adjustment aid is the clipping warning, which is located behind the small inconspicuous box in the right and left upper corner of the histogram.

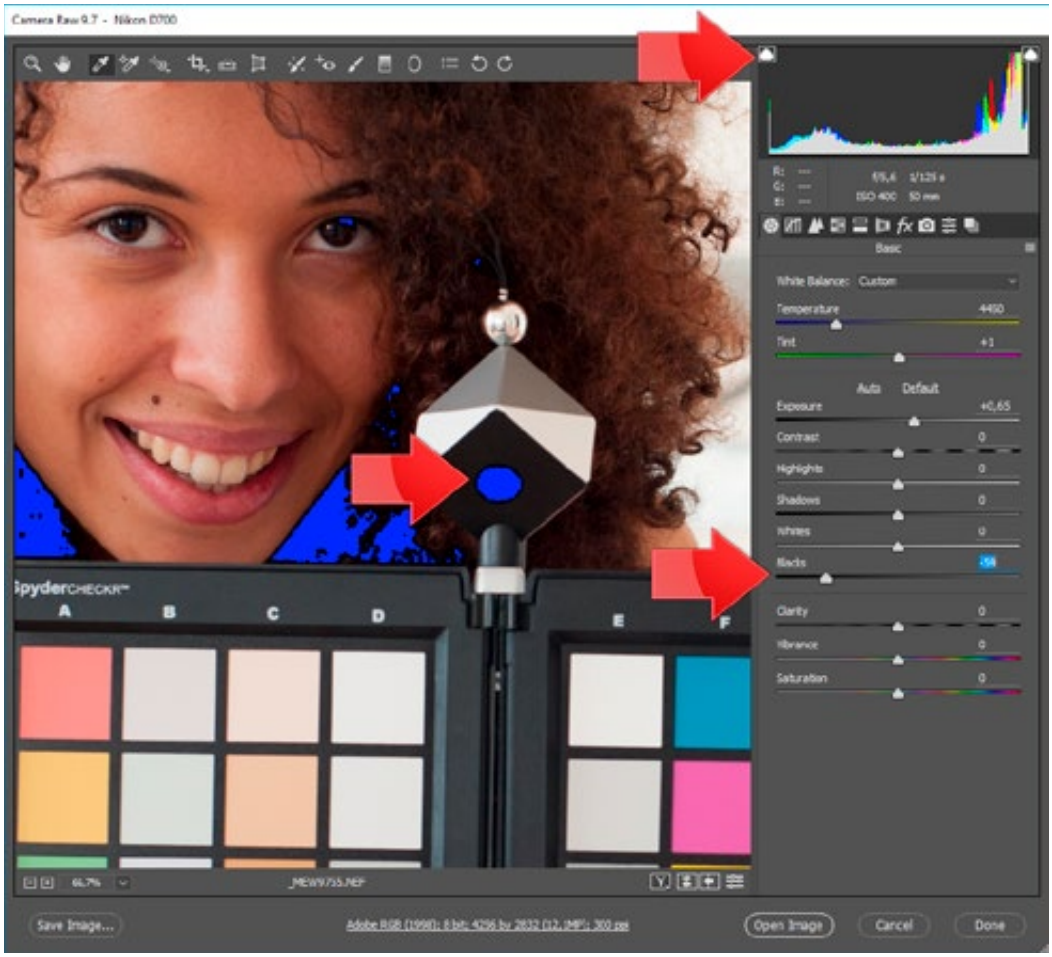
TIP

You will find a reference for highlights, or eroded white, in the chrome ball. The white surface, on the other hand, always needs to show detail. Optimum white is 90% saturation, black (directly lit) is 10%, and everything else is 5%.

Black level

How to adjust pictures to get the right colors

If your software has an extra eyedropper tool for determining the black level, click into the “light trap.” If there is no such tool, as in Photoshop and Lightroom, set the black using the corresponding adjuster so that you can make out a clear difference between the black surface and the black hole. That will adjust the colors in the picture properly. In numbers, the saturation value of the light trap is 0% while the black surface has a value about 5%.



When the clipping warning is on, the black level is adjusted downwards until the surface of the light trap has turned completely blue.

Transfer settings

How to choose the right approach according to picture volume

To get the best results for all the pictures you have taken under the same lighting conditions, there are different strategies that depend on the software. With Photoshop's Camera Raw dialogue you can choose between **two methods**:

- **Method 1:** Open the picture with the SpyderCUBE, make the adjustments that have already been described, and close the dialogue by clicking the "Done" button. Then switch to Adobe Bridge, the Photoshop picture viewer and open the appropriate list and select the optimized image. Copy from here by right-clicking on the adjusted file for the design settings, then select all files that still need to be adjusted and apply the settings to those files.

- **Method 2:** At the same time, open data in Photoshop Camera Raw. Make the adjustments to one file, then mark all the others and "synchronize" using the corresponding button. Important: this allows you to transfer only the specified parameters.

TIP

The first method is recommended for working with a large number of pictures, and the second is better for up to 100 photos depending on the RAM available on the computer.

Transfer of settings in Photoshop Camera RAW

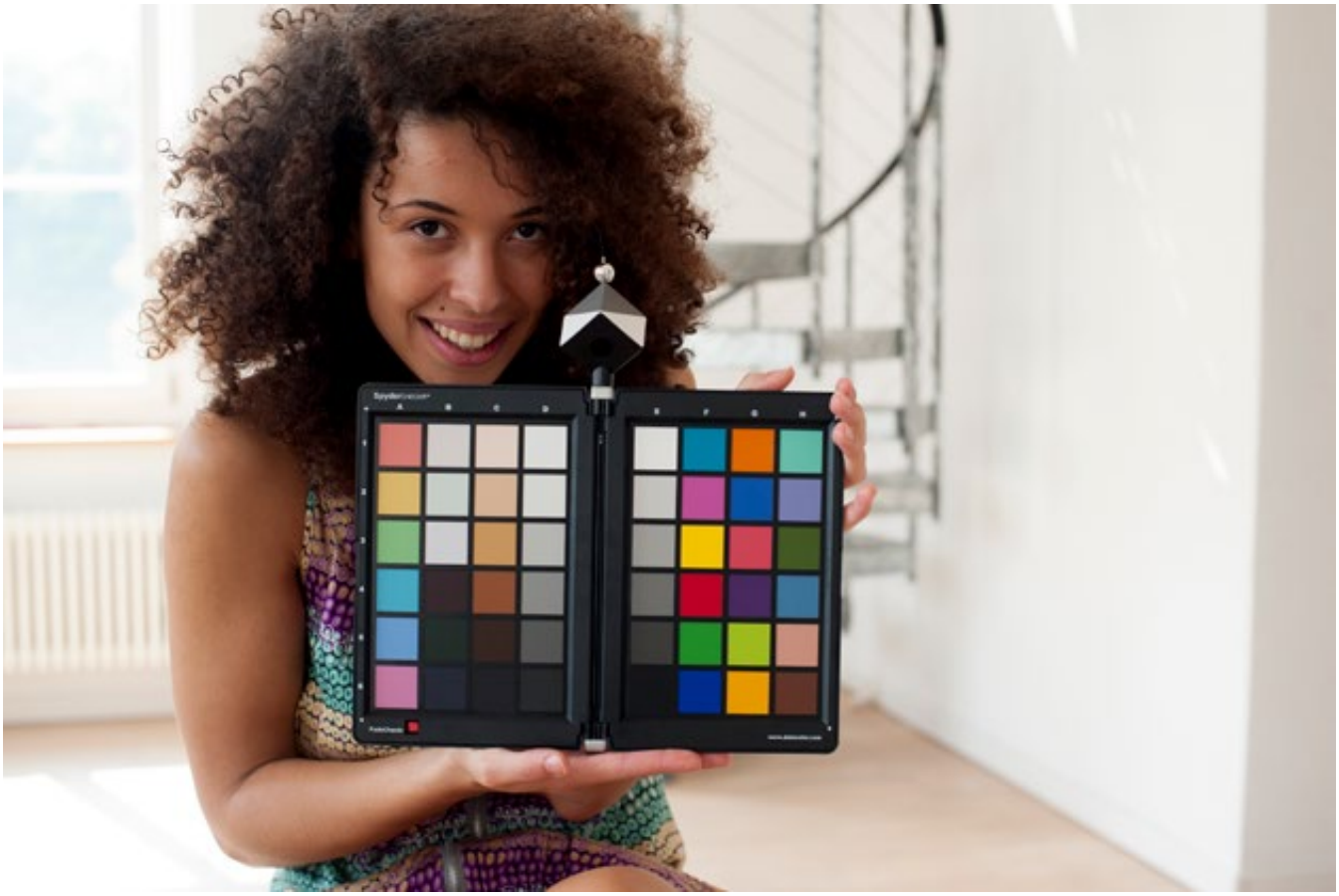
INTERESTING ONLINE FINDS

Many of the benefits of SpyderCUBE are best achieved in controlled conditions, but it can also be a helpful tool in the field. In this article, David Cardinal shares how he used it while traveling through Cambodia and Myanmar.

Read Article >

Color balance

How to balance colors



Next to an equalized contrast balance, balancing colors is the second most important part of color integrity in photography. Some photographers try to accomplish this goal with color checkers without the appropriate software. They manually re-measure the colors and use the color correct tool from their preferred RAW converter to create neutral correction settings. This approach is not wrong in theory, however, the practical implementation during the finishing process is very time intensive and often imprecise.

Adjust color balance using the SpyderCHECKR

How a color chart guarantees colors that are true to life

There are tools supported by available software to help you achieve consistent results faster. The SpyderCHECKR from Datacolor, for example, has a color chart that works as a combination hardware and software solution. The SpyderCHECKR guarantees reliable colors for the RAW workflow, color standards for every camera, and subsequently a reduction in time spent on the finishing process. In addition, it includes functions for equalizing the color balance for skin tones, especially for portrait and fashion shoots. The SpyderCHECKR also offers neutral grey targets and grey shades for the white balance in the camera.

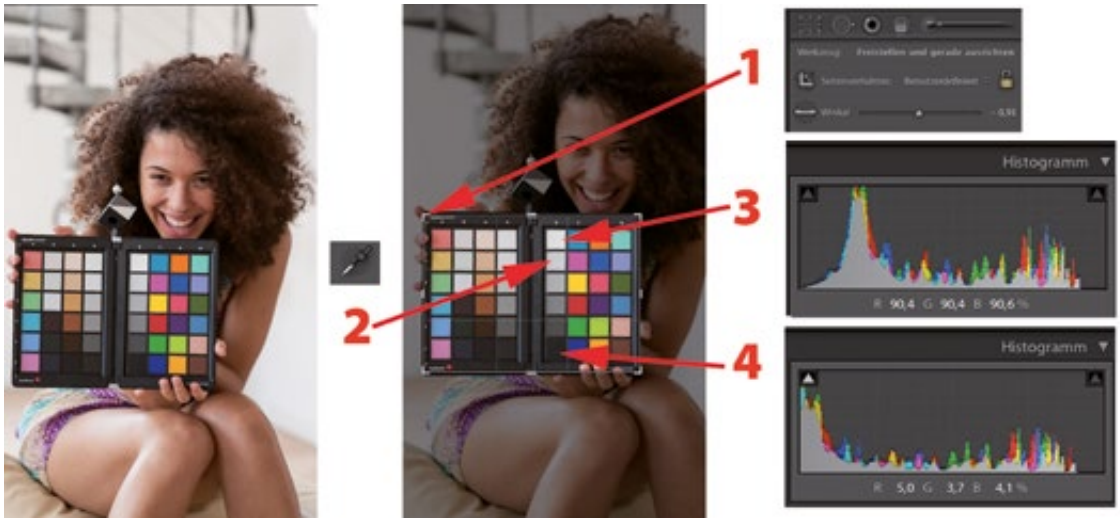
INFO

The software included with SpyderCHECKR works with Adobe Photoshop CC, Adobe Photoshop Lightroom CC and Phocus, the Hasselblad RAW converter.

The SpyderCHECKR software builds correction settings using its analysis of photos taken in a specific lighting situation. With these settings, even huge productions can be color balanced with a single click.

Using SpyderCHECKR

How to optimize color references



Before each photo session there should always be one exposure in which the SpyderCHECKR is as horizontal as possible, placed in the scenery.

- Take a photo of the SpyderCHECKR as upright as possible in the final light setting, using RAW mode before you begin the actual shot
- Install the SpyderCHECKR software
- Load the RAW image that you shot with the SpyderCHECKR into your image editing software and adjust it there first. In this example, we are using Adobe Lightroom 6
- Next, in the RAW converter, crop the image to the size of the SpyderCHECKR (1)
- Click on the E2 field of the SpyderCHECKR using the “white balance selection” tool, to measure and match the color temperature (2)
- Finally, move the mouse over the E1 field and read the value underneath the histogram (3)
- Now adjust the brightness using the “exposure” control, so that the field displays a brightness of 90% (RGB: 230/230/230)
- Proceed to do the same with the black slide control and field E6 (4). The black level here needs to reach 4% (RGB: 10/10/10)

INFO

The values specified above will not always be able to be exact. In these instances, you should try to at least achieve an approximation or a natural average value.

SpyderCHECKR app

How to define presets

Now transfer the analysis from the color fields to the SpyderCHECKR software in Lightroom. After right-clicking on the image, go to “Edit in” in the context menu. In Photoshop Camera Raw the application has to be started manually (from the installation folder). The RAW data developed should be saved as a 16-bit TIFF in AdobeRGB (1998) and then dragged and dropped to the SpyderCHECKR software or by clicking on the right mouse tab (Instruction “Apply in” in Lightroom). After the SpyderCHECKR app starts, position the field overlay by turning and scaling until it covers all fields as centrally as possible.

Then select a mode:

- Colorimetric: produces neutral colors
- Saturation: provides more saturated color tones
- Portrait: reduces red and orange tones so that skin tones appear more accurate

Finally, save the calibration for the application you would like to use it in later. You can even save multiple settings, one after the other. To use these defined presets, however, you will need to restart Lightroom. The color separation settings based on the SpyderCHECKR analysis are modified in the “HSL” field according to the preset application.

INTERESTING ONLINE FINDS

Check out a quick tutorial showing how to use SpyderCHECKR and SpyderCUBE

Watch Video ›

Adjusting the autofocus of the system lens/camera

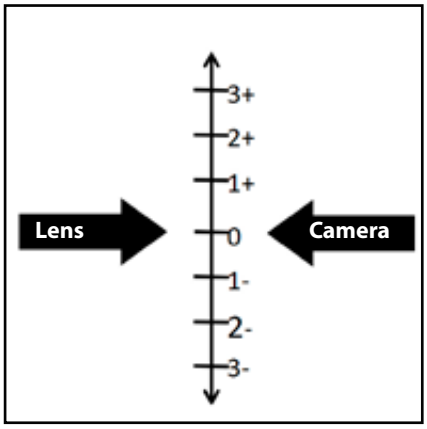
Advantages and disadvantages of using autofocus

Autofocus (AF) is now an integral part of today's photography world. Especially when working at a quick pace, photos are clear because the automated technology reacts faster and works more precisely than humans.

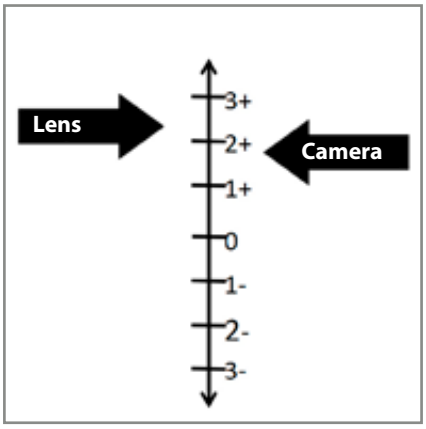
But there are also disadvantages. Many photographers have been complaining since the development of autofocus that it is not always precise and does not work reliably in every situation.

The AF sensor field in image 1 is targeting the second pointer but the focus is slightly behind (back focus).

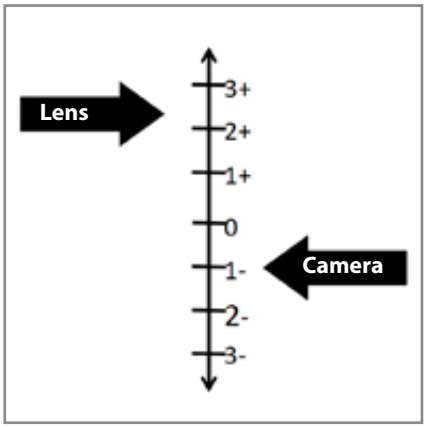
Many photographers are frustrated by autofocus errors. These are often explained by the camera choosing the wrong object or the wrong point on the object as the focus point. But there is another possibility - one that we do not like to consider in light of the cost of purchasing such a high-end camera. The interplay of the camera and lens tolerances could be at fault. DSLR cameras often have their AF sensor in the camera bottom and not on the sensor level. The light beam is directed to the AF sensor via a mirror. The system is more complex due to the interchangeable lens, and thus more susceptible to errors. This phenomenon is referred to as back focus or front focus when the AF sensor informs the camera that the focus is right, but in reality, it is slightly behind or in front of the target focus point. This problem has intensified with the growing number of high-resolution cameras. Tolerances fluctuate due to the high-performance of modern DSLR cameras. The combination of the camera and lens tolerances could be to blame, which in practice means that the camera/lens system needs to be adjusted.



Zero tolerance for camera and lens would be optimal, but is unrealistic.



It is possible that the tolerances of the camera and the lens are mutually leveled.



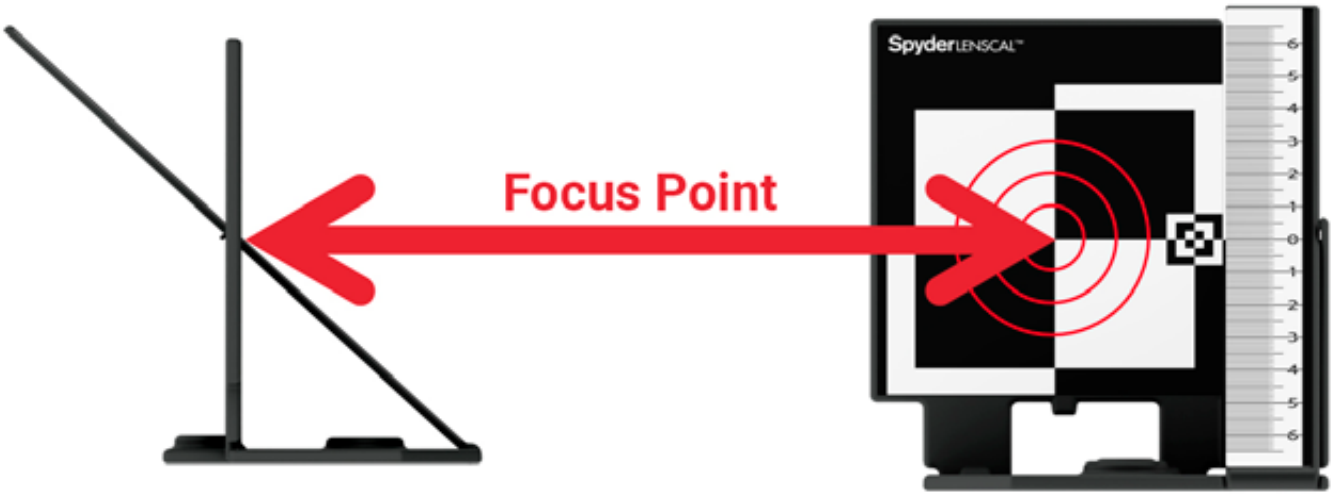
Conversely, the tolerances of the camera and the lens can also intensify, leading to blurring.

INFO

Datacolor tested the systems (camera / lens) of 1,040 visitors during the market launch of the SpyderLENSCAL at Photokina in 2010. It came out that about 650 of the tested systems had imprecise autofocus systems over all price classes.

How to test your autofocus

It is easy to find out if this problem affects one or more of your lenses. Take a picture of a flat object in an upright position. Did it not come out as sharp as it should have? Then it could be that your camera, your lens, or that a combination of the two tends to focus too far to the front or back.



The distance between camera and SpyderLENSCAL should be about 25-50 times the focal length of the lens. The focus point should be at the center of the chart.

Calibrate autofocus using the SpyderLENSCAL

How to get razor-sharp autofocus

The SpyderLENSCAL is one measuring device that is easy-to-use to precisely determine the extent that AF fails. If a photographer is aware of this failure, the defocus can be compensated in many DSLR cameras and a few compact camera models through the camera-user interface.

Left: The SpyderLENSCAL is ready for use. Right: The SpyderLENSCAL is in collapsed position. It's clear to see the water scale of the SpyderLENSCAL in both.

Installing SpyderLENSCAL

How to calibrate your autofocus

- First, mount your camera on a stable tripod. Do the same with the SpyderLENSCAL on a second tripod. Adjust the SpyderLENSCAL so that the water scale is in line with the optical axis. Alternatively, position the SpyderLENSCAL on a firm, level surface, like a dining table at the height of the camera lens
- Set a small ISO value to minimize noise
- Use an open aperture: f1,4 or f2,8
- Focus the middle of the field of view with the AF. The aperture should be open to the max setting and trigger the shutter
- Check the photo on your camera's display. To find out where the focus point is, zoom in on the zero value of the scale level and check whether the center of focus is at zero
    - If this is the case, your system works perfectly. You will need to look some where else for the solution to your focus problem
    - If your camera is still not focusing, correct the settings in your camera's firmware to the determined value (keyword "AF fine-tuning") and then take a new test shot

The SpyderLENSCAL and the camera should be aligned along the optical axis.

For a calibrated system, the focus point should be on the zero line of the scale.

A correction of a defocused system can be made in the user interface of the camera.

INTERESTING ONLINE FINDS

Jay P. Morgan, from The Slanted Lens, does a great job showing how the SpyderLENSCAL works so you can make sure your autofocus is always spot on.

Watch Video >

Take a look at a Datacolor tutorial, which explains in a few steps how to use the SpyderLENSCAL.

Watch Video >

Cameras with AF calibration

The AF fine-tuning feature is integrated in a growing number of DSLR camera and high-end lenses. Here we have compiled a list of camera and lens models that have integrated the AF adjustment. This list should not be considered exhaustive. Some DSLR cameras from the mid-price category are equipped with this function, however, you should be sure to check manufacturers' websites.

Manufacturer	Model
Canon	50D, 70D, 6D, 7D, 5DS, 5DS R, 7DMkII, 5DMkII, 5DMkIII, 1DMkIII, 1DMkIV, 1DsMkIII, 1Dx, 1DxMkII, 1Dc,
Nikon	D7000, D7100, D7200, D300, D300s, D600, D610, D700, D750, D800, D800E, D810, D3, D3s, D3x, D4, D5
Pentax	K5-II, K5-IIs, K-20D, K-30, K-5, K-7D, K-2000/K-m, K200D, 645D, K-x, K-3
Sony	A850, A900, A77, a7R II, a7S II, a7 II, a7 R, a7 S, a7, a99, a68
Olympus	E-30, E-620, E-5
Sigma	Art Serie

TIP

You can find a selection of more cameras with AF fine-tuning here.

More Info >

Glossary

AdobeRGB (1998):
The AdobeRGB color space was specified by Adobe in 1998. The objective was to create a color space from which the CMYK color space of a color printer could be adapted to the RGB color space of a monitor. It is larger than the sRGB color space.

Bayer filter:
Photo sensor named after its inventor Bryce E. Bayer. The sensor is overlaid with green, blue and red filters, which are in a ratio of 50% green, 25% blue and 25% red. In this way, it approximates the sensitivity of the human eye, in which green accounts for the greatest share of the perception of brightness.

Border shadowing:
See objective vignetting

CCFL display:
This is a first generation flat screen. CCFL stands for Cold Cathode Fluorescent Lamp. In contrast to today's monitors, which are illuminated with LEDs, the CCFL displays produce light using neon tubes.

Cd/Candela:
Candela is the SI unit of the SI basic variable of luminosity.

CEPS tools:
CEPS stands for Color Electronic Page Setting. In photography, this involves photo retouching or photo editing with the aid of image editing programs such as Adobe Photoshop or Adobe Lightroom.

CIE-xy color space:
The CIE standard valence system has been defined by the International Commission on Illumination (Commission internationale de léclairage). It is the link between human perception and physical causes.

CMOS technology:
CMOS stands for Complementary Metal Oxide Semiconductor. This involves semi-conductor technology, which has become widespread in photo sensors, etc. CMOS sensors are primarily characterized by low power consumption and short switching times.

Color balance:
The color balance determines the ratio of the colors to each other. For example, if the colors in a recorded image are not reproduced as they are in the original, the colors are not in balance.

Color fidelity:
Color fidelity is the measure of the deviation or the similarity of colors during recording and output. Color management systems are normally used to achieve maximum color fidelity.

Color fringes:
Color fringes, also called chromatic aberrations, occur in images because of deviations of optical lenses. Because the individual wavelengths of the visible spectrum in a lens are refracted differently, each wavelength range has its own focal point. In practice, this leads to color fringes, which are particularly visible on the contours and edges of an image. This error can be corrected using additional lenses, which are attuned to the respective wavelengths.

Color homogeneity:
The color homogeneity describes the color consistency or the color deviations from a set point over an area, e.g. the surface of a display. In the case of poor color homogeneity, the same color value is reproduced differently on the surface of the display. For example, this could cause a green tint on the upper right and a red tint on the bottom left corner.

Color noise:
Color noise, or image noise, describes the deterioration of image quality due to structures, which themselves do not carry any image information. The impacted image sections deviate from the actual image information in terms of color and brightness, and are especially visible in dark areas of the image in which the signal-to-noise ratio is very low.

Color separation:
In the prepress stage, this means the conversion of the colors of a wide variety of image datasets, mostly to the CMYK color model. The colors are separated into the print colors cyan, magenta, yellow and black.

Color space:
A color space is a defined range of colors. The best-known color spaces from the RGB color model are sRGB and AdobeRGB (1998), as well as the CMYK color model, Euroscale Coated v2, Fogra39 and ISO Coated v2.

Color temperature:
The color temperature describes the light mood and is specified in Kelvin. A cooler light mood (bluish) prevails, for example, more in a cloudy sky, than in sunshine (yellowish).

Contrast:
Contrast is the ratio of the brightest to the darkest area of an image.

Contrast balance:
Is the ratio of the brightest and darkest areas and is defined from where the light is being drawn.

Cross-effect:
The cross-effect originally came from analogue photography, in which a slide film was combined with a negative development process or a negative film with a reverse development. The colors are artificial and the contrasts are higher. This effect is often used for artistic styling and is imitated today by digital techniques.

Contrast ratio:
See contrast

DLP projector:
DLP stands for Digital Light Processing and it is a technology developed by Texas Instruments where the image is created by an array of micro mirrors within the optical path. A special feature is that the red, green and blue pixels are not generated simultaneously (as in LCD projectors), but by quick alternate flashing through a rotating color filter wheel.

Glossary

ECI RGB:
The ECI (European Color Initiative) RGB is a standardized RGB color space, which covers a large part of the printing processes, as well as all currently known display technologies. Thus, it is a color space that is designed especially for the needs of the graphic arts and prepress.

eciRGBv2:
Further development of ECI RGB. It has been optimized in terms of the visual equidistance, as is known from the CIE-L a*b* color space. This results in a minimization of banding and clipping errors, as with the L-Star color space. The ECI recommends using the color space as early as data creation, for example when converting RAW data or 16-bit material to 8-bit color depth.

EXIF information:
The Exchangeable Image File Format (EXIF) is a standard format for saving metadata in digital images. EXIF information can be, among other things, a camera model, shutter speed, ISO value, aperture or date and is written in the header of the image file.

Fine Art Printer:
There is no uniform definition for the term Fine Art Printing. All Fine Art printers attempt to create an image which most closely resembles a one-of-a-kind or work of art, in terms of its properties, selected image, and post-editing, and in the use of the best photographic materials.

Gamma:
In relation to a monitor, gamma refers to the modulation of an input signal to a desired output signal. In practice, this means that a low-contrast image is obtained by correction of the output signal to contrast.

Gamut:
Is the description of the color range which can be reproduced by a technology or a technical device.

Grey balance:
"Achromatic" colors are the grey shades that lie between white and black. These are produced by equal proportions of the respective primary colors such as cyan, magenta and yellow (CMY) in the print or red, green, blue (RGB) in self-luminaires. If the primary colors change to equal proportions, a grey may become brighter or darker, but remains neutral grey. If the color components are no longer in the same proportion, one can immediately perceive a grey tint and that gray balance is no longer maintained.

High-Key image:
In high-key photography bright tones, few contrasts and soft light lend style to an image.

ICC profile:
An ICC profile describes the color space of input and output devices such as printers, scanners, digital cameras or monitors and refers to the reference values.

IPTC conventions:
IPTC is the acronym for International Press Telecommunications Council. As per the IPTC convention, metadata are saved to the header of an image file for improved classification. They contain such things as parameters such as file format, file size, filename, height and width in pixels of a file, date recorded and the description of the contents.

Kelvin:
Kelvin is an SI unit of temperature measurement. It is also used for measuring the color temperature.

L*a*b* color space:
Is a device-independent color space and describes all perceivable colors equally, so that color deviations can be described by a Delta E.

LCD:
This refers to Liquid Crystal Display. The liquid crystals regulate the light impermeability per color channel. LED monitors are also LC displays, but irradiate the color filters from the rear with LEDs instead of fluorescent tubes.

LCD projectors:
The white light of the projector lamp is split into 3 basic colors by a prism and then sent through 3 LC displays, which control the image information per color channel. Subsequently, the image is put together by another prism. LCD projectors are characterized by a smaller contrast range, but can reproduce the colors very differently.

Low-pass filter:
With image files, so-called Moiré effects may occur instead of very fine recurring structures, which are at the limit of the sensor's resolution. These small, colored structures have a specific pattern, but are not part of the image information. Low-pass filters are used to prevent these phenomena.

L-Star RGB:
A modern color space, which combines the advantages of a higher color resolving power of the human visual sense of the CIE-LAB color space with the usual RGB color spaces like AdobeRGB and ECI-RGB. Banding and color tipper errors are reduced to a minimum when viewed on a display and in printing.

Luminance:
The luminance describes the brightness of image points

Luminance homogeneity:
Describes uniformity of brightness for a defined area. A poor luminance homogeneity of a monitor can be seen as vignetting, although all image areas must be equally bright.

Look Up table:
IT term. Look Up table (also called LUT) are tables in which application-specific values are stored which are used in a program routine.

Glossary

LUT:
See Look Up table

Luv color space:
A color space that is calculated from the CIE-XY system, similar to the L*a*b* color space. This system is mainly used for the evaluation of light sources or monitors.

LED backlight:
This refers to a flat radiator that consists of many light emitting diodes and is used for the background lighting of an LED display.

Low-Key image:
In contrast to high-key photography, low-key photography uses little light as a stylistic device. Light is used consciously to accentuate highlight contours and the few details that are important for the image. Many sections of the image often remain in the dark. This lends a certain amount of drama to this type of image, a familiar sight in theatrical or stage photography.

Objective vignetting:
Vignetting refers to the shadowing of the image to its borders, which can be highlighted by components of the objective, such as lens mounts, and by filters or lens hoods. The effect itself is originally unwanted, but it is also used as a stylistic device.

Offset printing:
Is a printing method, in which the pressure roller does not directly contact the printed product, but the printing is transferred indirectly by a rubber roll. This is the most common method for printing books, newspapers and packaging.

OSD:
Stands for On Screen Display and describes an input menu window of a monitor, which is shown on the display

Primary colors:
Primary colors are the basic colors that compose secondary colors. Thus, the colors that a monitor can display are composed of the colors red, green and blue. The same applies to cyan/magenta/yellow, by means of which all colors which can be displayed by the process are mixed in printing.

Polarization layer:
A polarization layer, as used in LE and LC displays, ensures that light is polarized, which means only the fractions that oscillate in a plane are transmitted. This is the prerequisite for the option of regulating the light quantity per pixel with LCs.

Reflection idiosyncrasies:
Printing paper and photo paper have a large number of surface properties. The bandwidth ranges from matte and glossy to a wide variety of textures and materials. Every surface and every material have very specific characteristics, with regard to how they absorb and reflect light. These must be taken into consideration when setting up a color workflow.

Rendering Intent:
The way in which the colors must be converted from one color model into another.

Softproof:
In a softproof, the colors on a monitor are simulated as they will appear on the selected output material. Also know as ink color simulation.

sRGB:
Standard RGB is also a color space developed by Hewlett-Packard and Microsoft. It is widespread, but smaller than the AdobeRGB (1998) color space.

THM file:
THM files are miniature view video files, which are used to create a thumbnail image (miniature image) of the video file for improved orientation.

Tonal value:
The tonal value describes the measure of tone scales. For example, a digital camera with 8 bits per color channel has a tonal value reduction of 28 = 256 steps per color channel.

White balance:
In the case of a white balance, a camera should be set to the color temperature of the recorded scene to keep the color balance neutral. This is also done by the human eye, which evaluates colors in a largely neutral manner.

White luminance:
White luminance is the maximum brightness of a white point that can be displayed by a monitor.

White point:
The white point defines the white of a monitor with full control.

Wide gamut:
Gamut is the displayable color space of a monitor. Wide gamut features a device class that is characterized by a very large color space that is close to AdobeRGB (1998) or even slightly more. Monitors with wide gamut are typically used in image editing.

Workflow:
A workflow in photography includes all devices and technologies, which are used in the processing of the final image. A typical workflow includes a digital camera, image editing software, display units/monitors, and printers.

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Color management can be easy

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