



3 Monitor Calibration

The window into your image

- ✓ Initial calibration of your monitor
- ✓ The colorimeter's role during calibration
- ✓ Controlling ambient light
- ✓ SpyderProof analysis of your display's state

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The monitor as a window into the image

Why calibrate your monitor?

Until a photo is printed, the monitor is its “frame.” It is the basis for your assessment - the window into your image file- comparable to a light table with standard lighting used in the analog era. At events we’re often asked, “Is it even necessary to calibrate a monitor? The images already look really good.” If you are working in isolation and view images exclusively on your display, this may seem sufficient. But those who edit their images on an uncalibrated monitor with a color cast are unwittingly building color errors into the image file, based on inaccuracies on the monitor. If you then edit large quantities of image data in batch processing mode using this incorrect basis for assessment, you are destroying your image files – particularly if you don’t create copies or if you



don’t use the RAW format as the starting point for your workflow. Only when you choose to display your images elsewhere (different display, photo album, fine art print, etc.) will you realize that the wrong colors are being shown in your photo. This is why it’s so crucial to calibrate your monitor as part of your digital photo workflow.

That's why it's so crucial to calibrate your monitor as part of your digital photo workflow. This of course also applies to models in lower price ranges – a question we are frequently asked.



INTERESTING ONLINE FINDS

Before we go into greater depth about the technical details of monitor calibration, we'd like to take this opportunity to let you know about JP Danko's interesting Spyder5 test.

[Read Article >](#)

Quote:

"If you're an advanced hobbyist, a professional photographer, film maker, designer or anyone who relies on a screen as part of their work, there really is no excuse not to use a display calibration system."

JP Danko, DIY Photography

5 reasons you should calibrate your monitor.

- Every monitor displays colors differently. Monitors are shipped uncalibrated or pre-adjusted, but their colors continuously change over time.
- You can't simply rely on your own eyes to find the correct settings for your monitor. The way you see colors depends on factors like the time of day, the ambient light and your level of fatigue.
- Image colors are not true to life. Without calibration, the colors of your photos on your screen will not be properly displayed; the skin tones won't be quite right, the whites will have a hint of color and the blues may look cyan.
- Software-based monitor calibration, such as using the setting options included with the monitor's firmware or graphics card, can only provide linear correction at best. It does not take into account color variations that depend on how the LCD is adjusted.
- As a window into your image file, the monitor is uncalibrated - like assessing the colors in your images while wearing tinted sunglasses. This means that everyone sees colors differently if they don't have the same glasses. You can imagine the effects this has on prints at a printing company or even from your own printer.

This is why you should calibrate regularly

If your screen is set to be color-neutral, you can rely on how the colors are displayed – at least for a while. All monitors age with use and their color characteristics are constantly changing. To combat this, a monitor used daily should have its profile adjusted every two weeks. Depending on the device, these variations may occur to a greater or lesser extent and may not even be perceptible to the naked eye without a direct comparison. Anyone wanting to err on the side of caution when doing critical color work should nevertheless calibrate their monitor, ideally before each important project.



The eye is particularly demanding about skin tones, so you may see jarring differences between calibrated and uncalibrated displays. No one enjoys a green skintone!

How to calibrate your monitor

There are two options for creating your own color profile for your monitor: **Visually controlled software-only calibration** and **Calibration using a meter**.



Hardware-based monitor calibration with a colorimeter.

- **Software-based calibration:** You can roughly adjust the settings using software-based calibration by eye. A corresponding color control panel, which is included in the macOS system, guides you through the calibration process using a wizard, producing a visually customized monitor profile. This profile displays colors as neutrally as users themselves have judged and set. However, this process lacks primary color linearization or correction for non-neutral environments. It's merely a visual gamma optimization process, possibly with some white point adjustment.
- **Hardware-based calibration:** For most accurate and consistent results, a colorimeter, such as the Spyder5 by Datacolor, is used. This is a sensor that you apply to the screen. The sensor precisely identifies the colors displayed and renders a correction profile using the included software. These kinds of colorimeters are available in different price ranges. Those looking to profile different color spaces, or even print their own pictures, should invest in a colorimeter with a room light sensor. Only through regular calibration can continuous color accuracy be guaranteed, even when working with these devices.

This means that borrowing a colorimeter or having a service provider set up your workflow once is not enough. Below we'll show you how to perform a monitor calibration using the Spyder5.

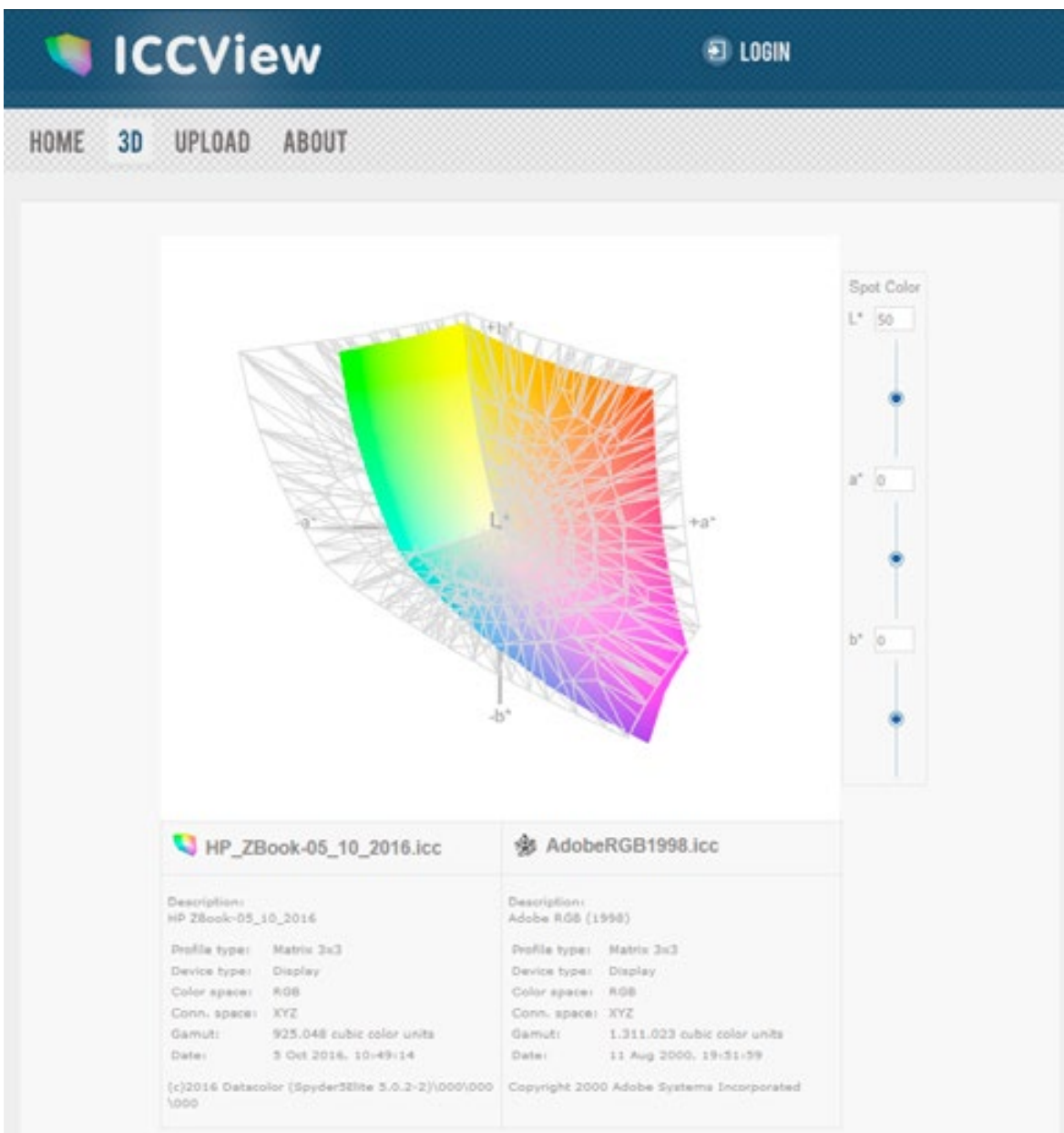


Menu window in macOS for software-based adjustment



TIP

A program for graphically displaying ICC profiles is available in Apple's Toolkit: the ColorSync Utility. For Windows users, there are websites you can use to visualize your profile, such as: www.iccview.de



The screenshot shows the ICCView website interface. At the top, there is a navigation bar with 'HOME', '3D', 'UPLOAD', and 'ABOUT' links, and a 'LOGIN' button. The main content area features a 3D visualization of a color space, showing a curved surface with a color gradient from blue to red. The axes are labeled L^* , a^* , and b^* . To the right of the 3D view is a 'Spot Color' control panel with sliders for L^* (set to 50), a^* (set to 0), and b^* (set to 0). Below the 3D view, there are two columns of profile information:

| HP_ZBook-05_10_2016.icc | AdobeRGB1998.icc |
|---|---|
| Description: HP ZBook-05_10_2016 | Description: Adobe RGB (1998) |
| Profile type: Matrix 3x3 | Profile type: Matrix 3x3 |
| Device type: Display | Device type: Display |
| Color space: RGB | Color space: RGB |
| Conn. space: XYZ | Conn. space: XYZ |
| Gamut: 925.048 cubic color units | Gamut: 1.311.023 cubic color units |
| Date: 3 Oct 2016, 10:49:14 | Date: 11 Aug 2000, 19:51:59 |
| (c)2016 Datacolor (Spyder3Elite 3.0.2-2)/1000/1000/1000 | Copyright 2000 Adobe Systems Incorporated |

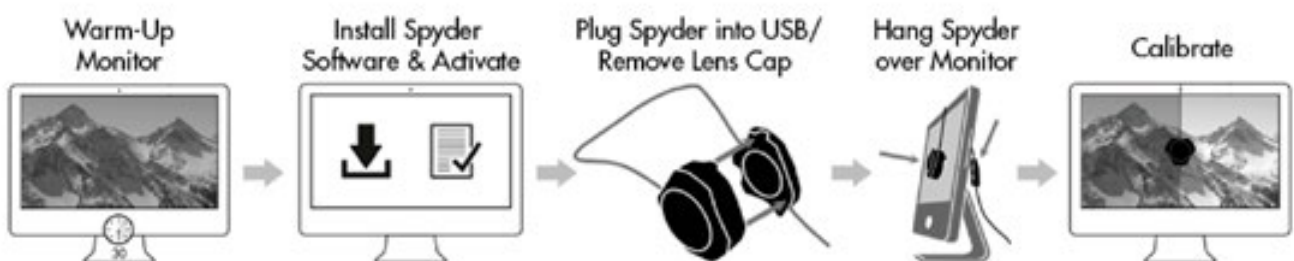
In this example, the displayable color space of a standard commercial laptop is shown in the AdobeRGB (1998) color space using ICCView.de.

Initial Calibration

What you need to know

Initial calibration refers to the first time a monitor is measured and adjusted. To ensure the monitor presets are taken into account, the software has to know what display type it's calibrating: is it a desktop monitor, a laptop display, or a projector? These device types have been developed for differing uses, and different calibration targets are necessary.

- **Laptop:** Laptop displays are used in changing ambient light conditions, which is why they are usually calibrated to display as bright as possible.
- **Desktop:** It is also common for desktop monitors to be calibrated for brightness to interpret the dynamic range of printed images. Calibration solutions, such as the PRO or ELITE versions of Spyder5, can use a room light sensor to measure the brightness of the monitor's environment and use these values to align the monitor's brightness settings. For example, prints would no longer be too dark due to the display being too bright during editing.
- **Projectors:** Calibrating projectors involves the linearization of primary colors. This is particularly important for AV shows in order to ensure the correct colors and density, even in shadow areas, and to match color from one projector to another.



Simplified chart to demonstrate the calibration process

Things to consider

Low-end screens often offer only a limited range of options for adjusting settings for contrast and brightness. Some professional monitors, however, have a number of controls in the on-screen display (OSD) to adjust the contrast and color display settings. If something is clearly wrong with the display configuration, the profile generated during calibration will not lead to a satisfactory result. You should then reset your monitor settings to the factory default using its “Reset” option.

LCD monitors sometimes have other drawbacks as well. For example, they often offer “dynamic” modes that continuously and automatically adjust the brightness to the ambient light. When taken together with a hardware-based calibration, the results can be disastrous, since these dynamic changes take place within the monitor and this information is not forwarded on to the operating system. These kinds of automatic functions should always be disabled for color-critical work such as image editing, and especially during calibration.



INTERESTING ONLINE FINDS

Before we go any further with the software, here’s another interesting blog post about how to calibrate a monitor.

[Read Article](#) >

Quote:

“Calibrating your monitor is a simple task and one that benefits you on many fronts. Aside from more accurate looking images and less strain on your eyes, calibrating your monitor will also help ensure your prints match your display. There is no reason you have to stick with the settings your monitor came with.”

Jon Martindale, Digital Trends

Software Installation

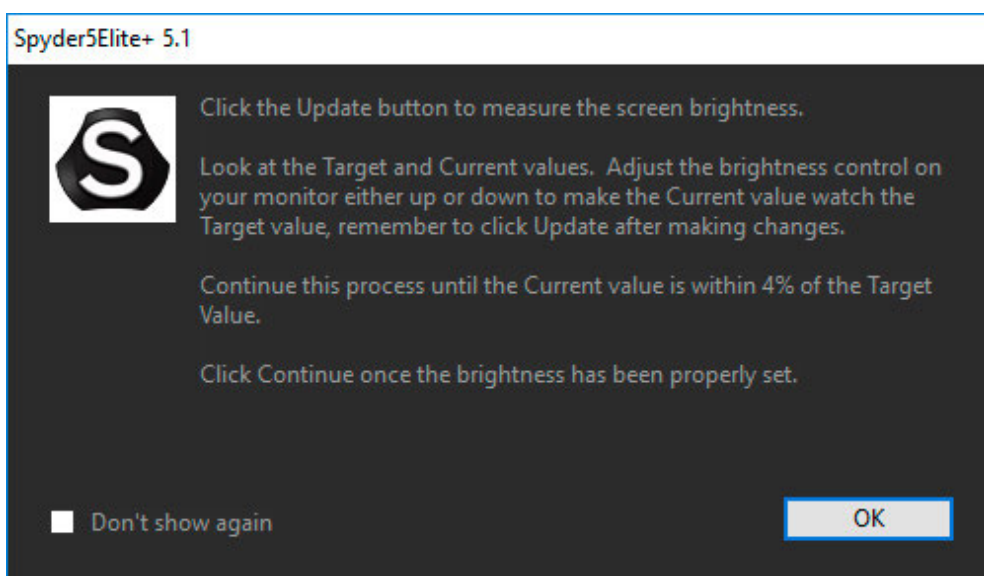
The first steps

The Spyder5 comes with a serial number and a download link to our software. This software carries out the calibration process for you in a largely automated way. Install the software and follow the instructions on the screen. If you've opted for the standard setup, a "Datacolor" folder is then added to your application files. Under Windows, start the program for the first calibration process using the Start menu; on a Mac, launch from the Spyder icon in the Menu bar.

Initializing the Software

The next steps are easy

Spyder5 utilizes two apps. The first, "SpyderUtility," will initialize in the background each time you start your computer after installation. It monitors the amount of time between calibrations and ensures the monitor profile generated through the measurement process is really being used by your system. This control function is important, whenever the correction data must be reloaded to the graphics card, such as when the computer comes out of standby mode. SpyderUtility also generates an icon in the Windows tray (to the right below the taskbar) and on the toolbar in MacOS. You can use this icon to launch the calibration software. In the Spyder5 PRO and ELITE versions, you can also measure the room light. Do not quit this Utility, or your color management may not continue to be correct.



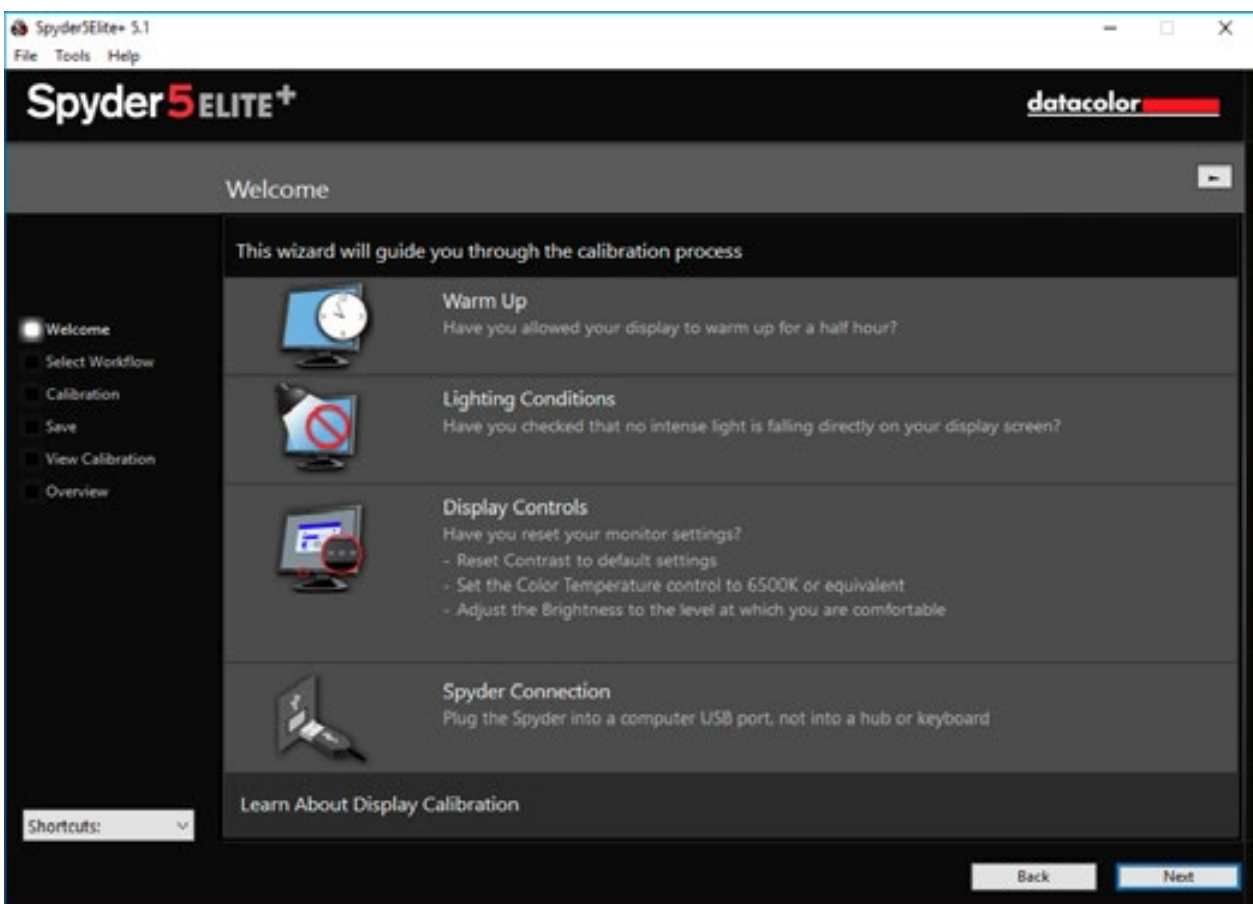
SpyderUtility is a small yet important tool that uses almost no system resources

Adjusting Monitor Settings

Preliminary Considerations

Please take into account the following before calibration, in order to prevent inaccuracies during the process:

- Let your monitor “warm up” for about half an hour
- Disable any automatic modes (dynamic brightness/contrast) in the monitor menu
- Avoid direct light sources on or close to your monitor



The wizard guides you through the calibration process in just a few steps

TIP

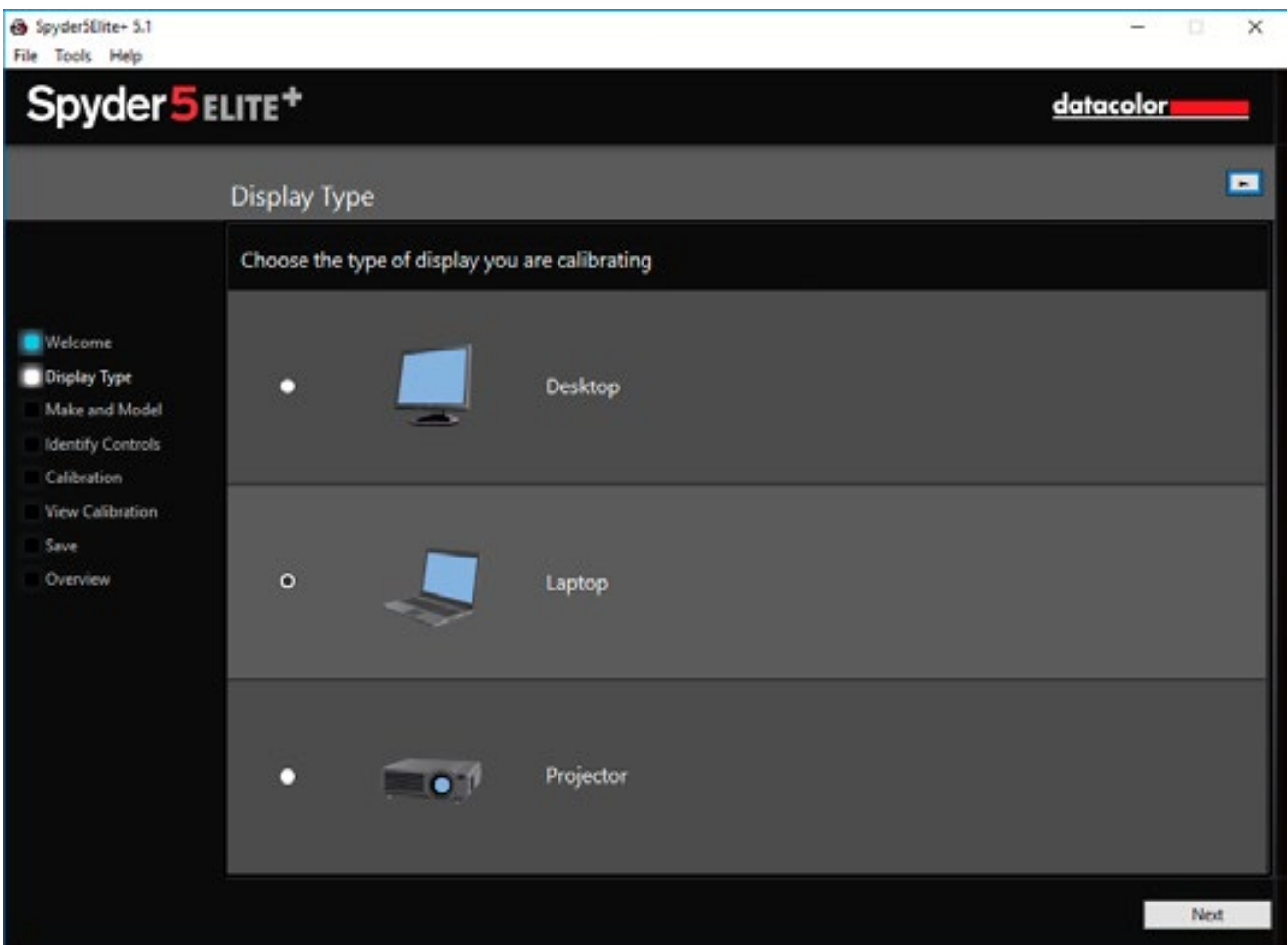
If your aim is consistent color at all times, we recommend switching off “energy management” to guarantee a stable operating temperature in your monitor.



Display Type

Select the right device type

Here you'll select what type of device you'd like to calibrate. The more specialized task of calibrating a projector is available in "Fine-tuning Your Monitor."

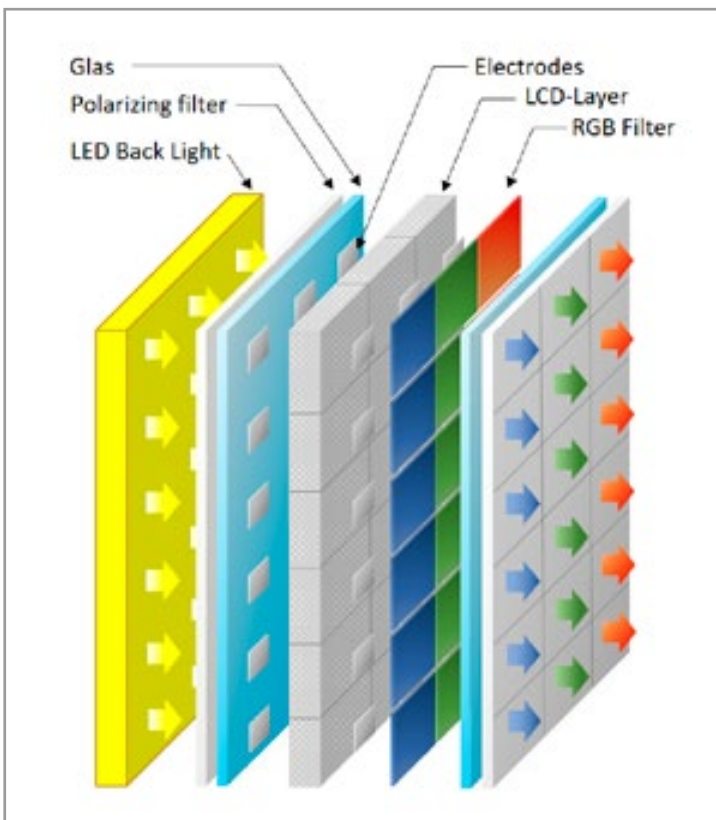


Three device categories can be calibrated with Spyder5ELITE.

Controlling Brightness and Contrast

How to proceed

Misunderstandings can lead to mistakes, so it's important understand how an LED display works. Different controls are provided with various internal or external displays which claim to adjust the "brightness." This graphic provides an optimum illustration of the problem. It is essential when calibrating the display to adjust the brightness on the monitor itself (also commonly accessible via the operating system) instead of an adjustment to the graphics card driver.



Operating an LED display. The second layer with LCD pixels can be controlled electronically, and regulates the transmission of light for each color pixel.

Backlight illumination: Use the backlight illumination to change the luminance. This involves a flat projector, in our case consisting of a number of LEDs. The background illumination is controlled by the hardware and on older displays can be adjusted either directly through an on-screen display (OSD) on the display itself or using a tool in the operating system.

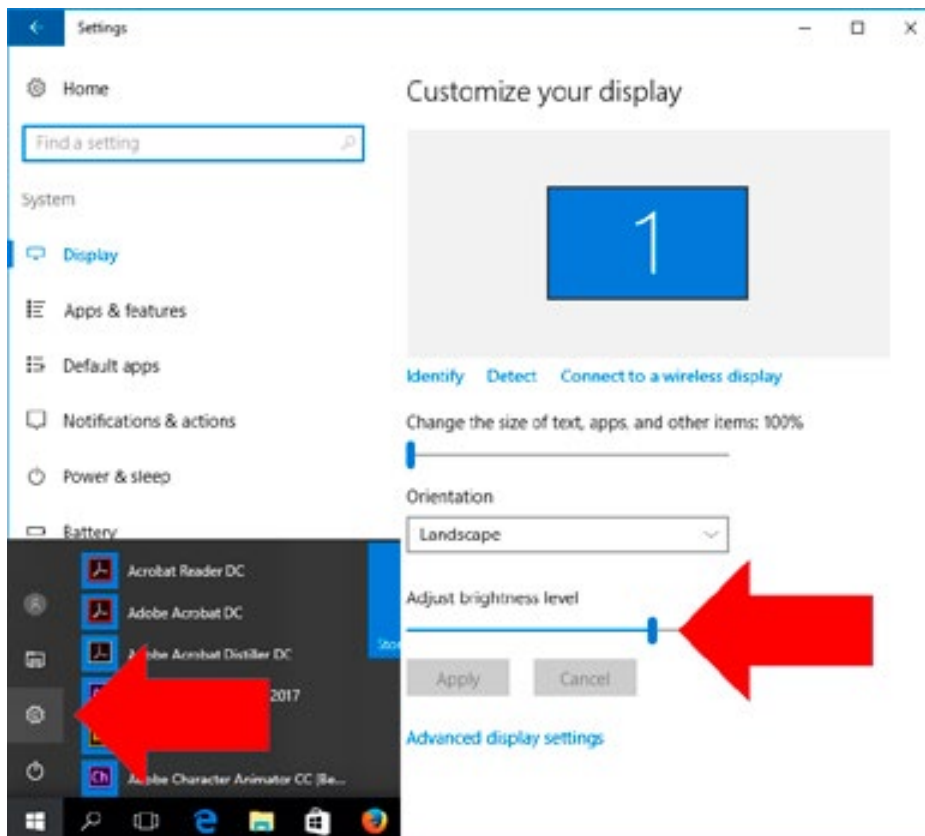
Note! This is the only place you can actually adjust the display luminance (brightness).

LCD layer/polarizing filter and RGB filter: Pixels are created at this stage. The liquid crystal diodes (LCD) are partially (pixel by pixel) controlled by the electrodes so that the LCDs change the direction of their polarization depending on the voltage applied. In conjunction with the polarizing filters, the system works like a light valve so that the intensity can be controlled for each color pixel. This is where the graphics card driver brightness adjustments occur, but this is also where the correction values from color management are applied. If you allow adjustments (such as brightness settings) from the graphics card, these will overwrite the monitor calibration corrections.

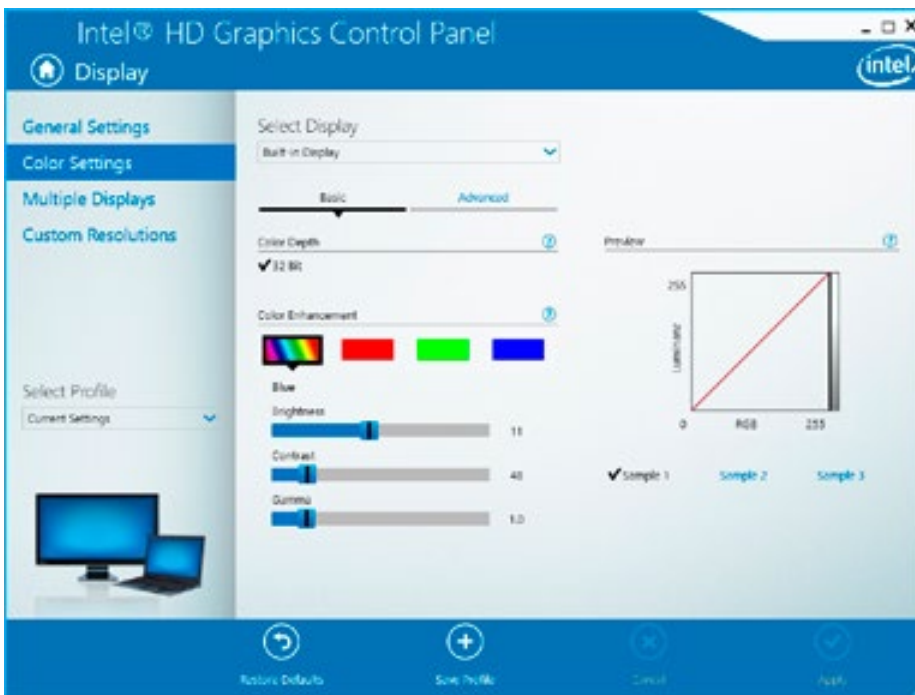
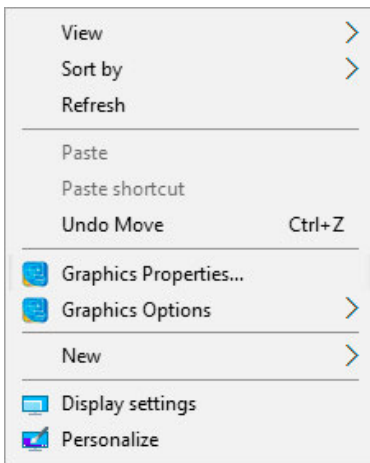


TIP

To reduce the luminance, please use the backlight control. The backlight control is also called the brightness control on some monitors. As a test, lower this control to the lowest value and watch the menu that is displayed by the monitor itself. If this OSD menu also gets darker, you're dealing with a true backlight control. However, if this menu stays as bright as it was when you started, while the rest of the screen behind it gets darker, this really is a brightness control, and should not be used to dim the display. Dimming a screen to 1/3 its maximum brightness with a brightness control can limit the number of colors the screen can display to 1/3 the usual number, causing visible banding.



Luminance is corrected on a free-standing monitor using the **OSD**. However, in Windows you can also correct this via the Start menu, as illustrated here. For laptops, there is usually the option to control the luminance using your keyboard (PC: Fn key plus brightness symbol key; Mac: F1/F2 keys, for finer control F1/F2 plus Shift and Option keys (for iMacs as well as Apple laptops.)

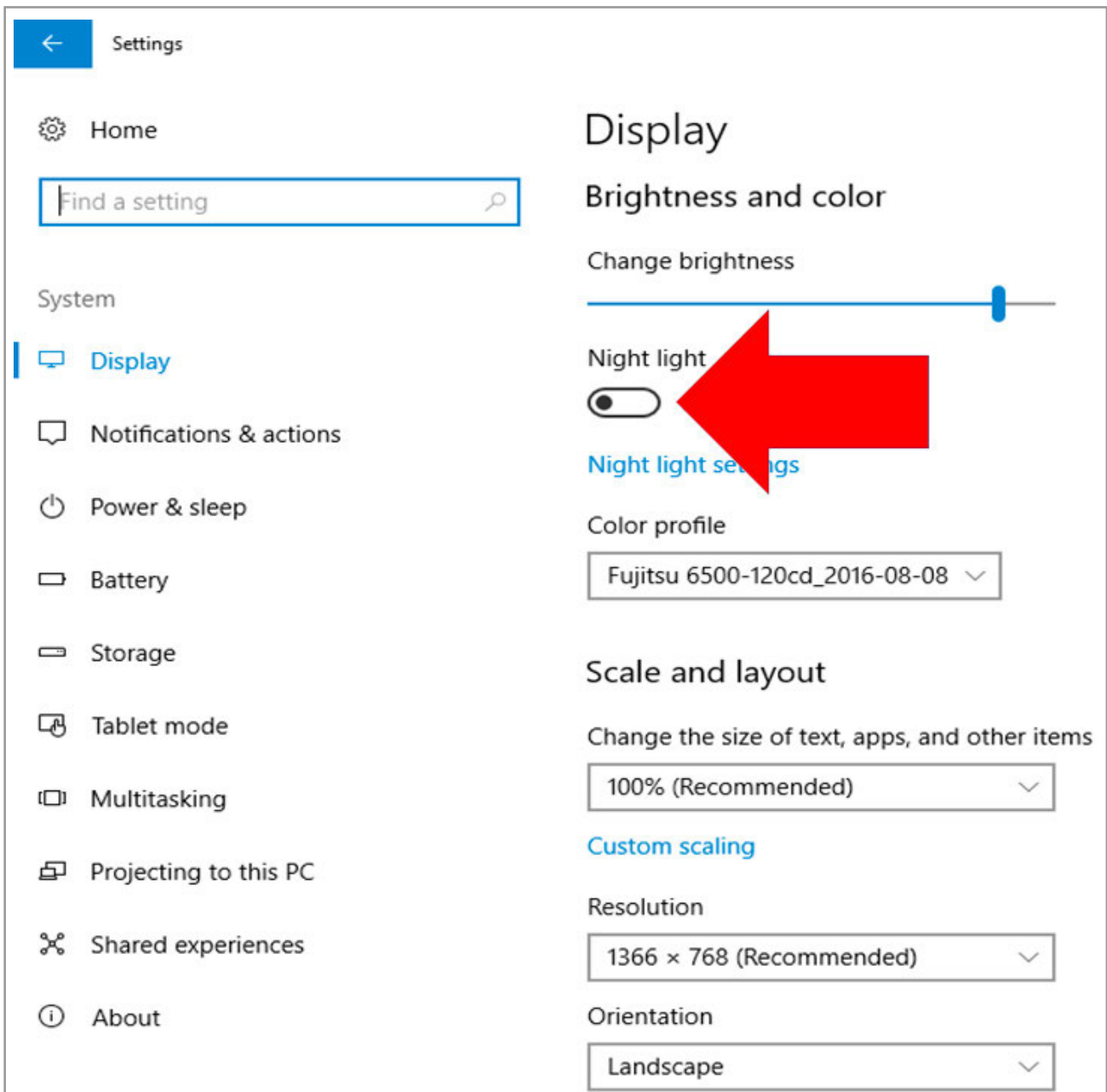


For Windows: Use the right mouse button to find the video card driver. The settings here should be set to “Standard,” i.e. brightness = 0, contrast = 50 and gamma = 1.0; where possible, graphics card driver tools and utilities should be deactivated. Otherwise, you’ll lose the corrective values for the color management system when these are overwritten.



EXPERT INSIGHT

Windows 10 Creators update: there is now a “Night Mode” function that can adjust the monitor’s color temperature depending on the time of day or the sunrise/sunset specific to your location. This function must remain switched off since it will overwrite all calibration data, as well as present incorrect color. For Macs beginning with macOS 10.12.4, a similar “Night Shift” mode is available at the top of the Displays window of System Prefs. Be sure it is not enabled.

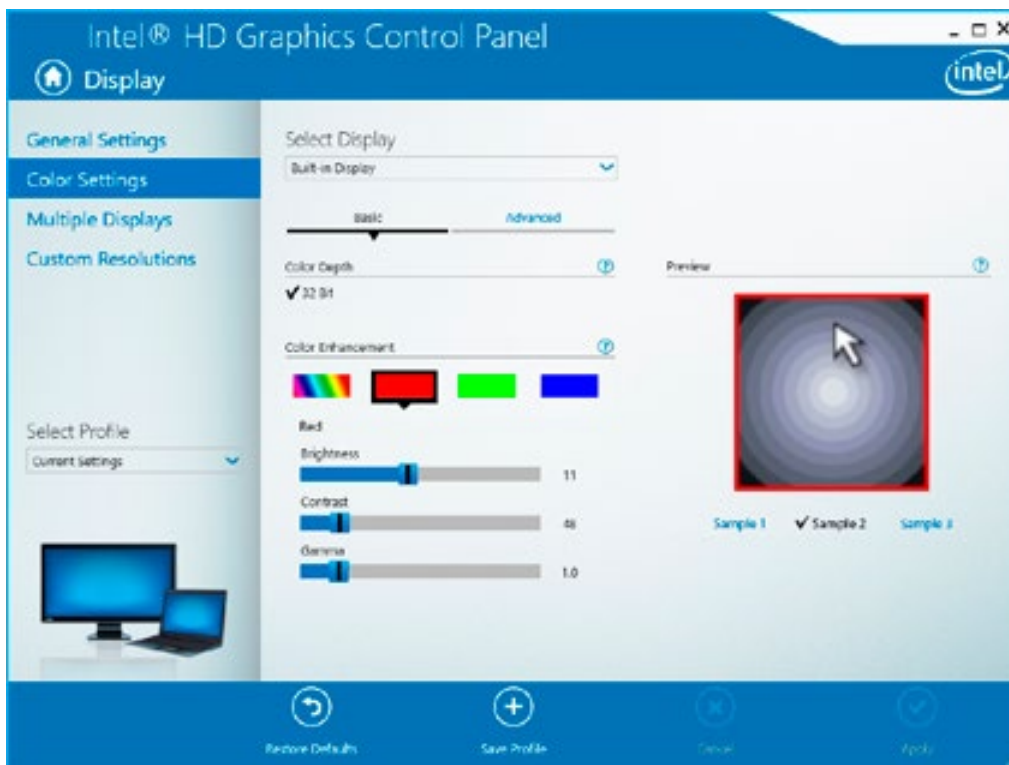


Night mode (night light) function on the Windows 10 Creators operating system must be turned off.

Controlling Color

Settings to adjust

Color and color temperature settings are also adjusted using the OSD. These can be accessed in different ways, depending on the display. The better the contrast, color temperature, etc. presets are to the calibration target, the more flexible and high quality the end result will be with the profile.



The RGB primaries can be corrected individually using the graphics card driver tool for brightness, contrast and gamma. When carrying out a visual correction without using a colorimeter, you make adjustments by eye. However, always make sure these settings are set to "Standard" if you want to calibrate the display with a colorimeter.

INFO

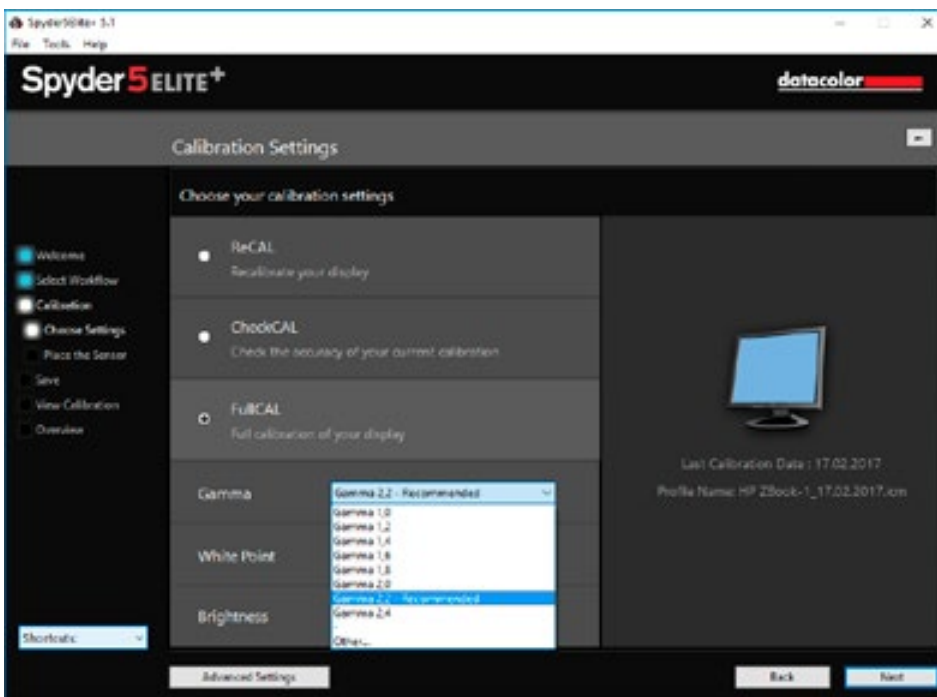
If your monitor has a visible color cast, you can use the PRO and ELITE versions of Spyder5 to control the RGB parameters. This function is activated through the Spyder software settings (under "Advanced Settings"). The internal color depth on many monitors is usually 10-12Bit per channel. At this point, the RGB pre-calibration option uses the monitor's greater color depth to enable a pre-adjustment of the color temperature without any visible losses to color smoothness.



Calibration Settings

Set a target

Before calibrating, you need to decide the target points for your device. You can choose parameters for “gamma,” “white point,” and “brightness.” If you aren’t sure exactly how you need to calibrate your monitor, use the default recommendations. These are designed to work for the vast majority of users, who are not doing specialized work in unusual color spaces.



You can choose between full calibration or re-calibration in the Spyder5 software menu, and you can also adjust the gamma, white point and brightness.



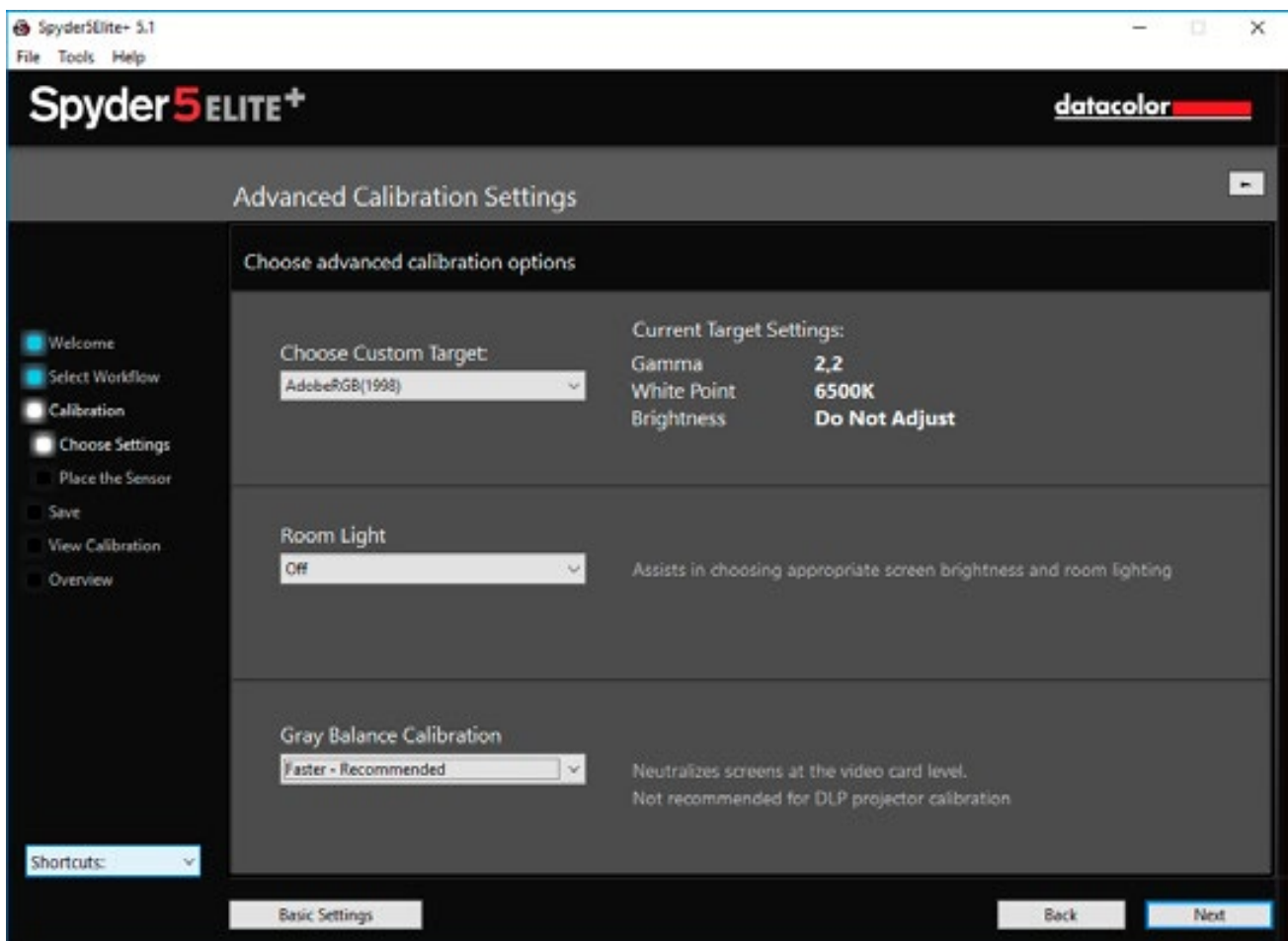
EXPERT INSIGHT

For a long time, monitor calibration apps made no distinction between initial calibration and follow-up measuring processes. Each time a profile was identified, the user had to work through all of the settings again and again, even though the same hardware was usually being measured under the same conditions. User-friendly programs now work in a more convenient manner. With Spyder5 software, these functions are called ReCAL, CheckCAL and FullCAL.

Advanced Calibration Settings

Professional specifications

Clicking the “Advanced Settings” button opens a somewhat more technical dialog box that allows you to access three additional software functions. You can select a combination preset for the adjustment parameters for the previous dialog box, particularly calibration targets for video editing, or non-gamma targets. You also have the option of activating or deactivating the “Ambient light compensation” and “Gray balance calibration” functions. Learn more about what you can do with this and how these features optimize your calibration in “Fine tuning your monitor.”

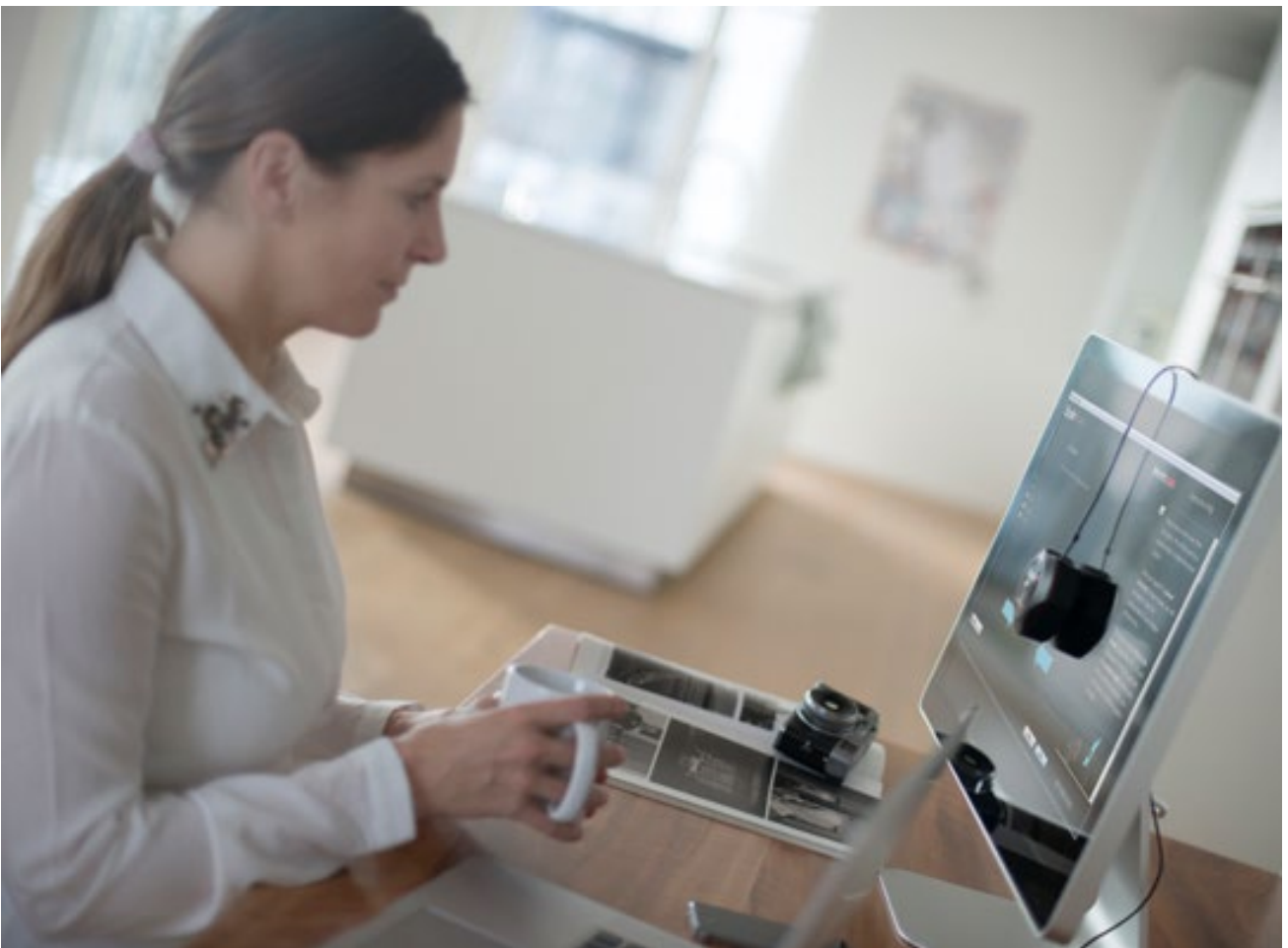


In the advanced calibration settings you have the option to select gamma, white point and brightness for a wide variety of color spaces. The following are available: AdobeRGB (1998), sRGB, ITU-R Rec. BT.2020, ITU-R Rec. BT.709, L-Star-6500, NTSC and PAL SECAM.

Measuring Color

What the meter does for you

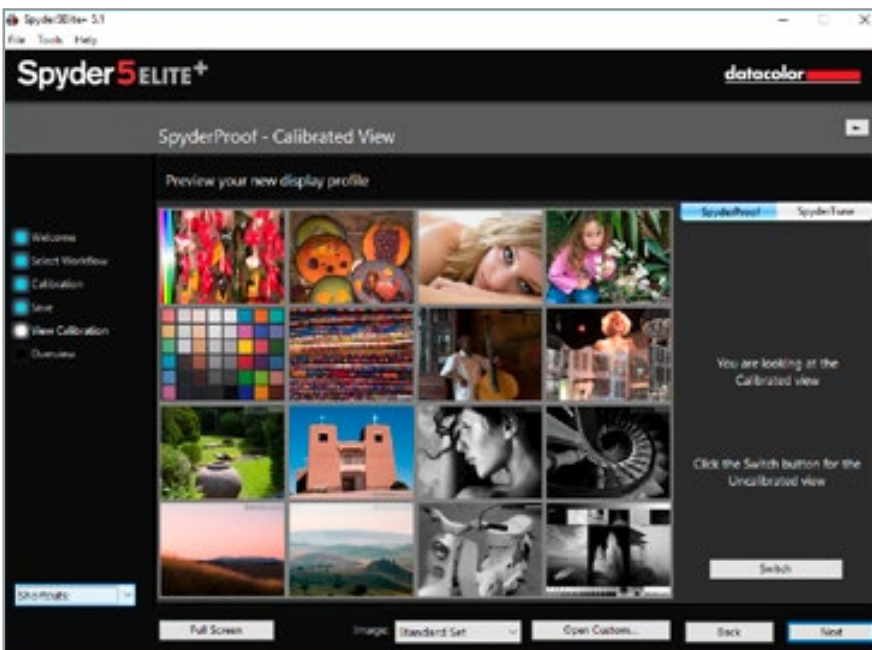
Here's where the colorimeter comes in. Once you've completed the preliminary steps in the software wizard, Spyder5 takes over communication with the monitor. Ideally you'll spend just a few more minutes by your computer. You then save the your new display profile under a meaningful name.



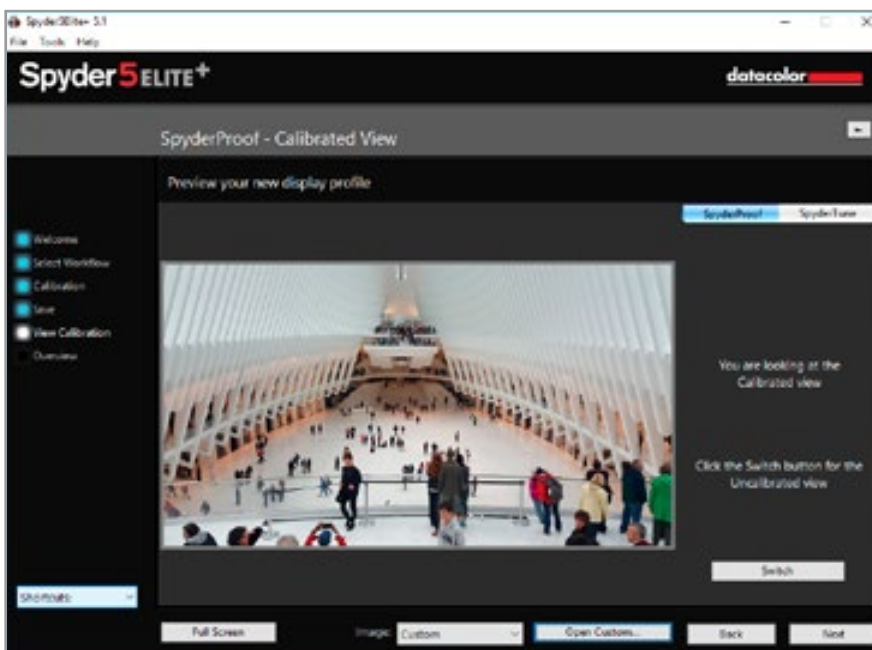
Spyder5 sensor at work (time for a coffee break!)

What you can see once you've created a profile

Different display options show you how the calibration has changed compared to the device's standard settings. Previously, there was usually a single before/after image. However, the Spyder5 software shows you a number of different kinds of photos. These give you a much more precise picture of how photo content and colors display differently. Spyder5PRO and Spyder5ELITE also give the software the option for you to include your own photos at this point. With Spyder5ELITE, you can also display the test images in full screen mode to compare the calibrated view with the uncalibrated one in detail.



A range of different image types arranged in a matrix make for a good basis for assessment



With Spyder5PRO and Spyder5ELITE you can also upload your own images so you can better assess your type of work using the before/after function.



With Spyder5ELITE you can then view your images in full screen mode.



TIP

Don't be surprised: Following calibration, images don't always look prettier at first glance. However, you'll almost always see more detail in the images. Calibrating a monitor or display does not mean displaying colors in a way that pleases you. Instead it means bringing the display characteristics into line with an imaging standard (ICC), which we learned about in the previous section on camera calibration. It's important for you to see exactly what's in the file on your monitor. On this basis, you can then further edit images digitally or make them more saturated or higher contrast, if you prefer.

Placing the Colorimeter

How to correctly mount the colorimeter



With Spyder5, you use the protective cap as a counterweight to ensure the sensor can be securely positioned on the display's surface.

- Hang the Spyder5 in front of the monitor
- Move the counterweight along the cable so that it hangs down behind the monitor. This is how you'll hold the Spyder5 in the necessary position
- Lay the Spyder5 flat on the clean surface of the monitor. To facilitate this flat positioning, tilt the display back slightly if possible. This will stabilize the position of the Spyder5 with its own weight.



Once the setup is complete, the software shows you where to position the sensor.

Measuring

What you'll see during calibration

Expect to spend about five minutes on the first calibration: During this time, the colorimeter determines the ICC profile for your monitor together with the software. Meanwhile, the target area in the middle of the monitor will display red, green, blue and gray tones. Once the measurement is completed, remove the Spyder5 from the monitor. If you've activated the "Ambient light compensation" function, there are additional dialog fields that will be discussed below.

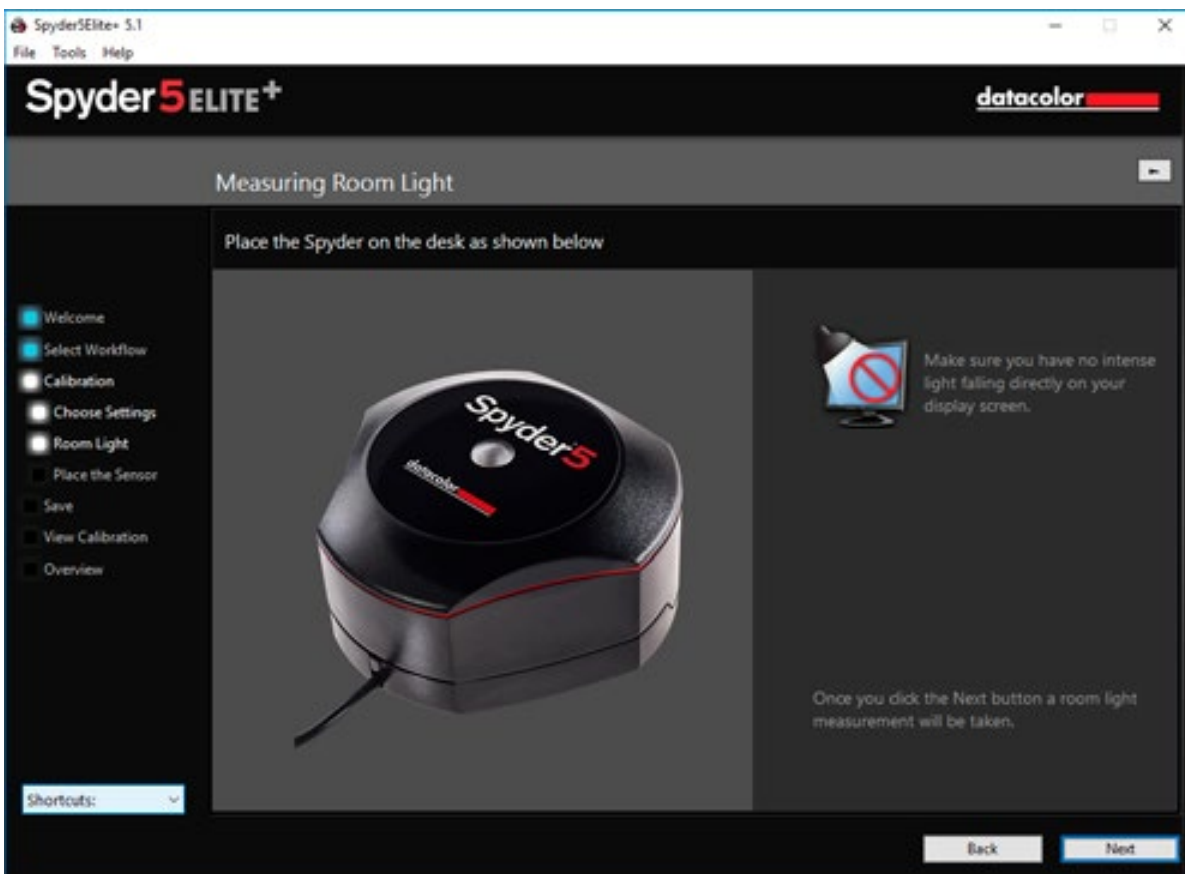


The sensor then measures a series of reference colors.

Measuring Ambient Light

How to proceed

The lighting conditions at your work station are important for calibrating your monitor. That's why an ambient light sensor has been placed on the top of the Spyder5. Activate the "Ambient light," function if you are calibrating a desktop computer. If you're calibrating a laptop, deactivate the "Ambient light" function, since you'd typically be working in various light conditions. However, if you tend to use your laptop in one place, we'd recommend activating the function as you would with a desktop computer. The ambient light is then continually measured when you connect the Spyder5. You can find the status under the SpyderUtility symbol in the menu bar or the Start menu.



Spyder5 software menu window for measuring ambient illumination.

TIP

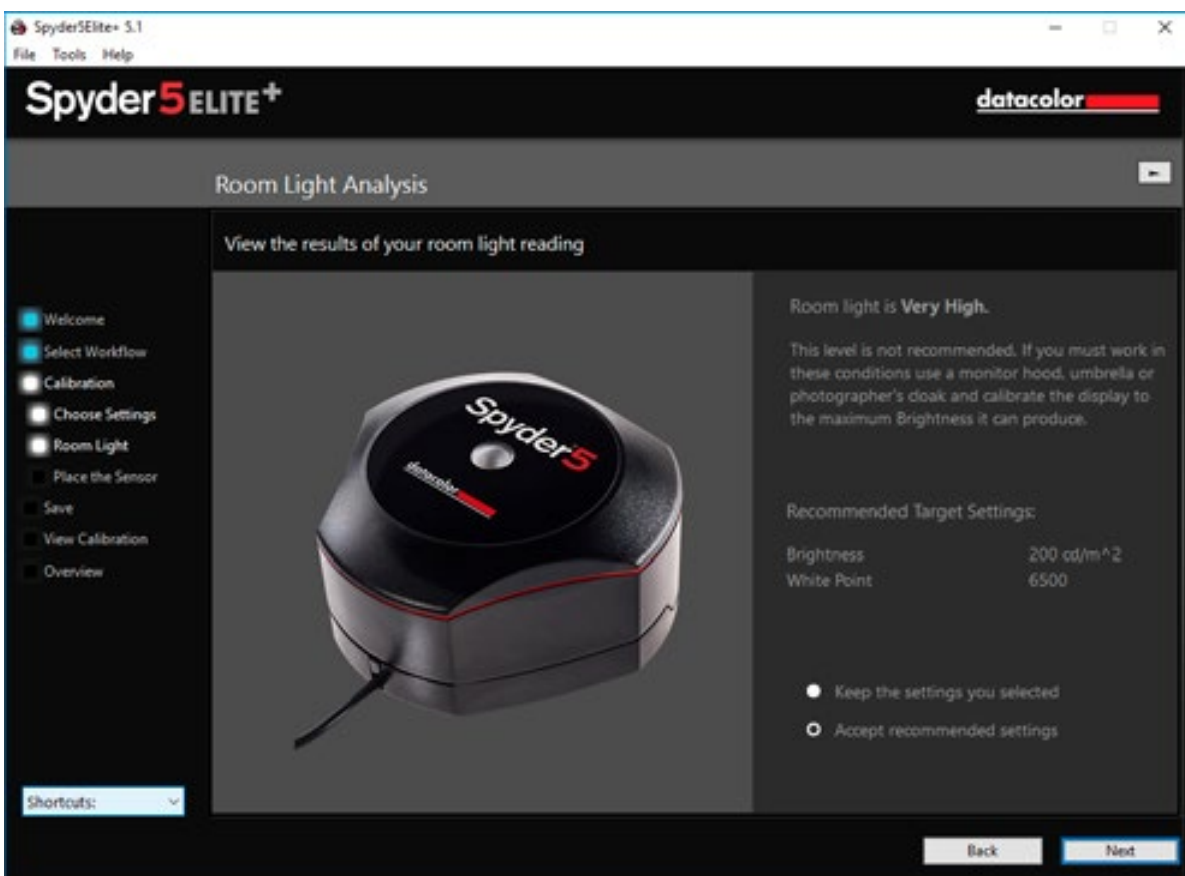
During this process, ensure no direct light falls on the screen or the Spyder5.



Ambient Light Analysis

How the wizard helps with optimization

Once lighting has been measured, the wizard will show you the results. Depending on the results, possible actions are displayed on your screen. These include suggestions for darkening or brightening the room. If that's not possible, consider an anti-glare device such as a hood. The wizard also provides you with target values for luminance and white point in order to achieve a more suitable brightness level and color temperature in your specific lighting situation.




Once the measurement has been completed, the software recommends specific target settings.

Readjustments

It's easy to make readjustments

You can accept the recommendations or keep your original settings. Then place the meter back on the screen and continue with calibration. This visibly measures the white luminance. If the value does not match the tolerance range of the values generated by the wizard, proceed as follows: Adjust the display to the required brightness level using the device-specific OSD settings or using the OS brightness control and click "Update." Please note the basic principles we went over in the "Brightness and Contrast" section.


Target: 120,0 cd/m²
Current: 188,0 cd/m²



Click update after you have made an adjustment

Update

Target: 120,0 cd/m²
Current: 121,3 cd/m²



Click update after you have made an adjustment

Update

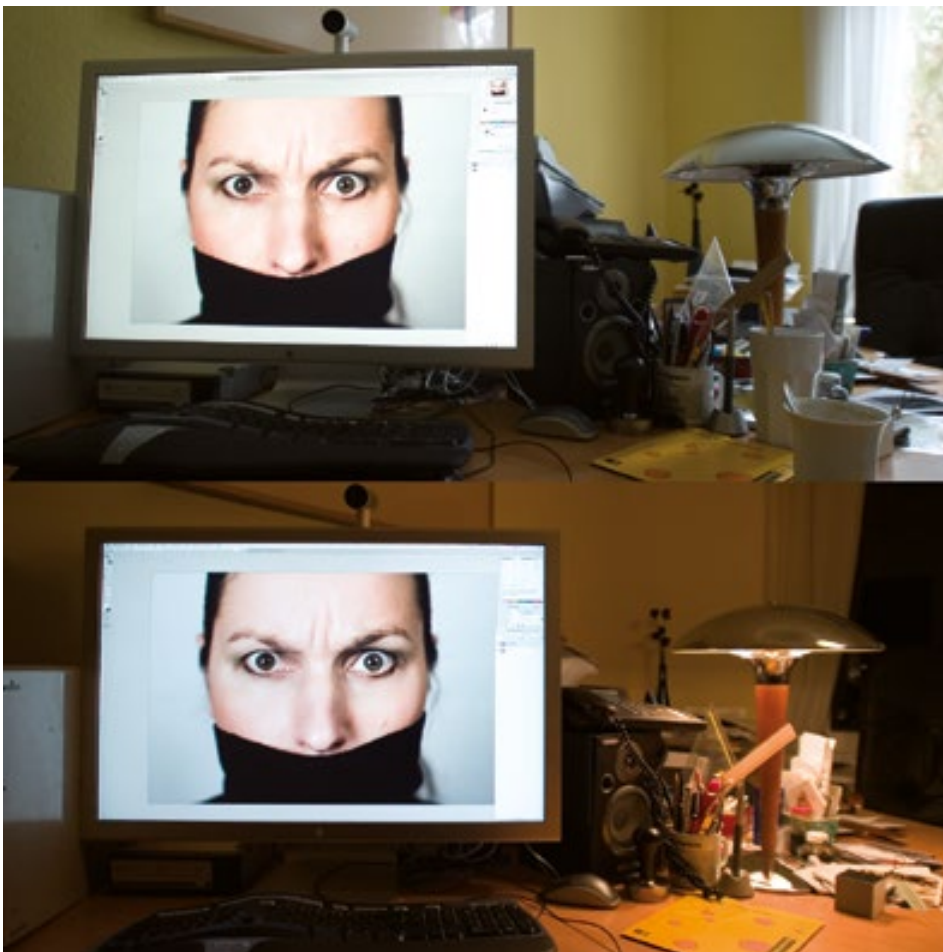
Once you have adjusted the brightness on the system, measure again with the sensor. The measurement results, including the tolerance range, will be displayed after measurement. On Mac screens, using Option-Shift while pressing the Brightness Up and Down buttons allows finer adjustment of the screen luminance.

Side Note: Ambient Light and the Ambient Light Sensor

What to consider

Your working environment is a key factor that is often forgotten during calibration. Constant light and temperature conditions are ideal, such as in air-conditioned rooms without natural light. If you edit images in a normally heated room with natural light, please be aware of the following:

- Place your monitor as far away from the window as possible.
- Turn the monitor away from the window to prevent reflections.
- Use blinds on windows and a dark display background, both of which reduce any side effects of light.
- Low, indirect lamplight is suitable in the morning and evening hours.



Simulation of the human eye's color response: the same image under different lighting conditions

The importance of an ambient light sensor

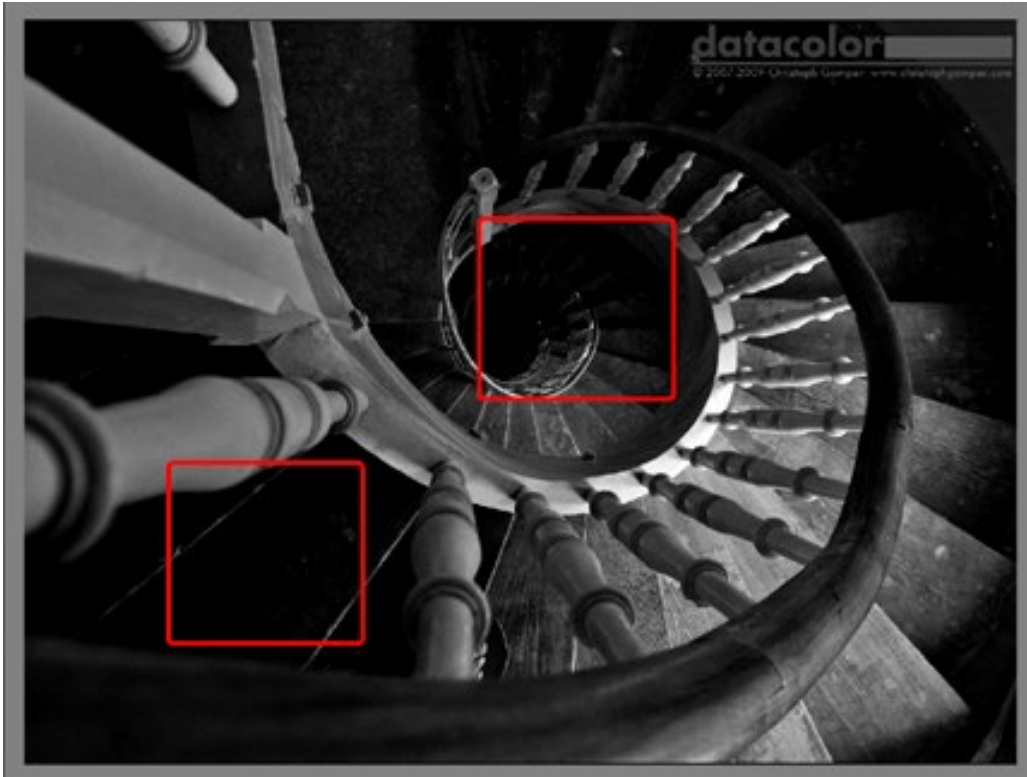


The ambient light sensor, marked with a red arrow on the image, is available with the Spyder5PRO and Spyder5ELITE.

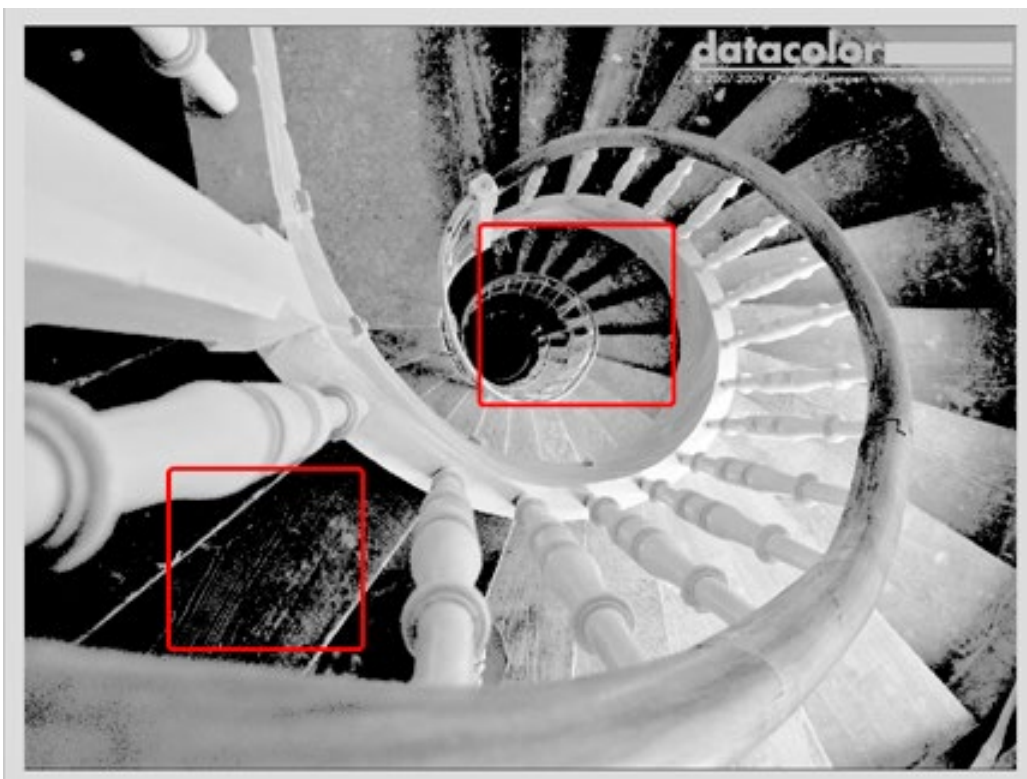
You may wonder if you really need an ambient light sensor, but we believe it is an absolute necessity.

Two key reasons why it's necessary to measure ambient light during calibration

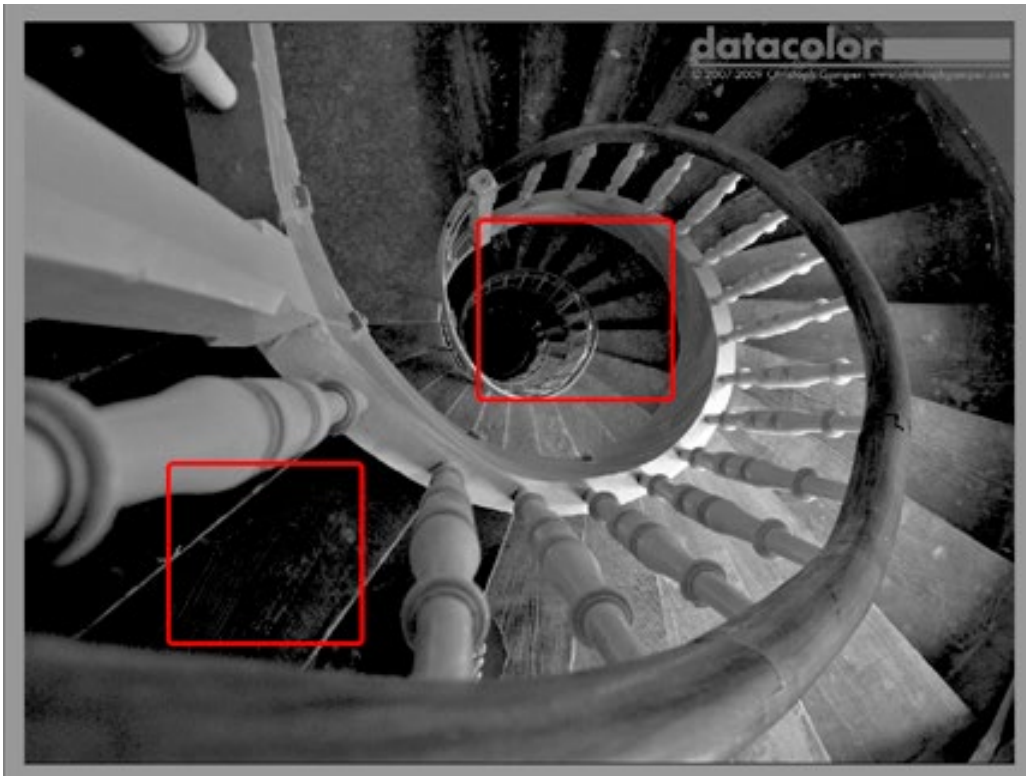
- **Differences in the contrast dynamics:** The monitor is a light source against a print that only reflects light. Images viewed on a monitor usually have much greater contrast than prints, since the white on the screen has a much greater brightness than the paper white of a printed image. If you don't calibrate the luminance of your monitor using an ambient light sensor, you will interpret the brightness of your images incorrectly and you'll edit the image file according to the brightness of your screen. In practice this means that you'll adjust the image densities down until you're satisfied with the result on your screen. The resulting print, inevitably, will be too dark.
- **Affects of ambient light changes:** Brightness is globally measured across the eye's field of view. This means that dilation of the pupil and the perceived changes to the brightness of light depends on the overall amount of light reflected into the eye, including the ambient background. If we change the lighting conditions by reducing the ambient light, the iris compensates by enlarging the pupil. In our case, this means we now perceive the monitor area to be brighter, even though the monitor was not part of the change in brightness to the ambient light. This changes the assessment basis on which we adjust our images. We think the image is too bright and correct for this; the result is an image that is too dark.



A classic black and white image with graphic structures and a lot of different gray levels. The areas marked in red typically define two critical zones that are prone to “blurring” when a monitor is not set up correctly, i.e. the structures in the shadows are no longer displayed even though they are there in the file.



The same image with an excessive gray balance in the black zone for illustration purposes. The grain on the stairs is clearly seen, as are additional stairs that appear out of the dark.



The same image, but the structures are balanced better here. We're not increasing the precision of our fine art friends who use the zone system. The fact that you're even seeing these structures is what makes the ambient light sensor useful, through its precise control of the monitor. It is a prerequisite for accurate correction. It also means you don't have to poke around blindly in the dark.

TIP

For all those who appreciate even the finest details, we'd like to recommend to recommend a discussion of the zone system in photography that Ansel Adams developed in the 1940s.

[More Info](#) >

Profile Name

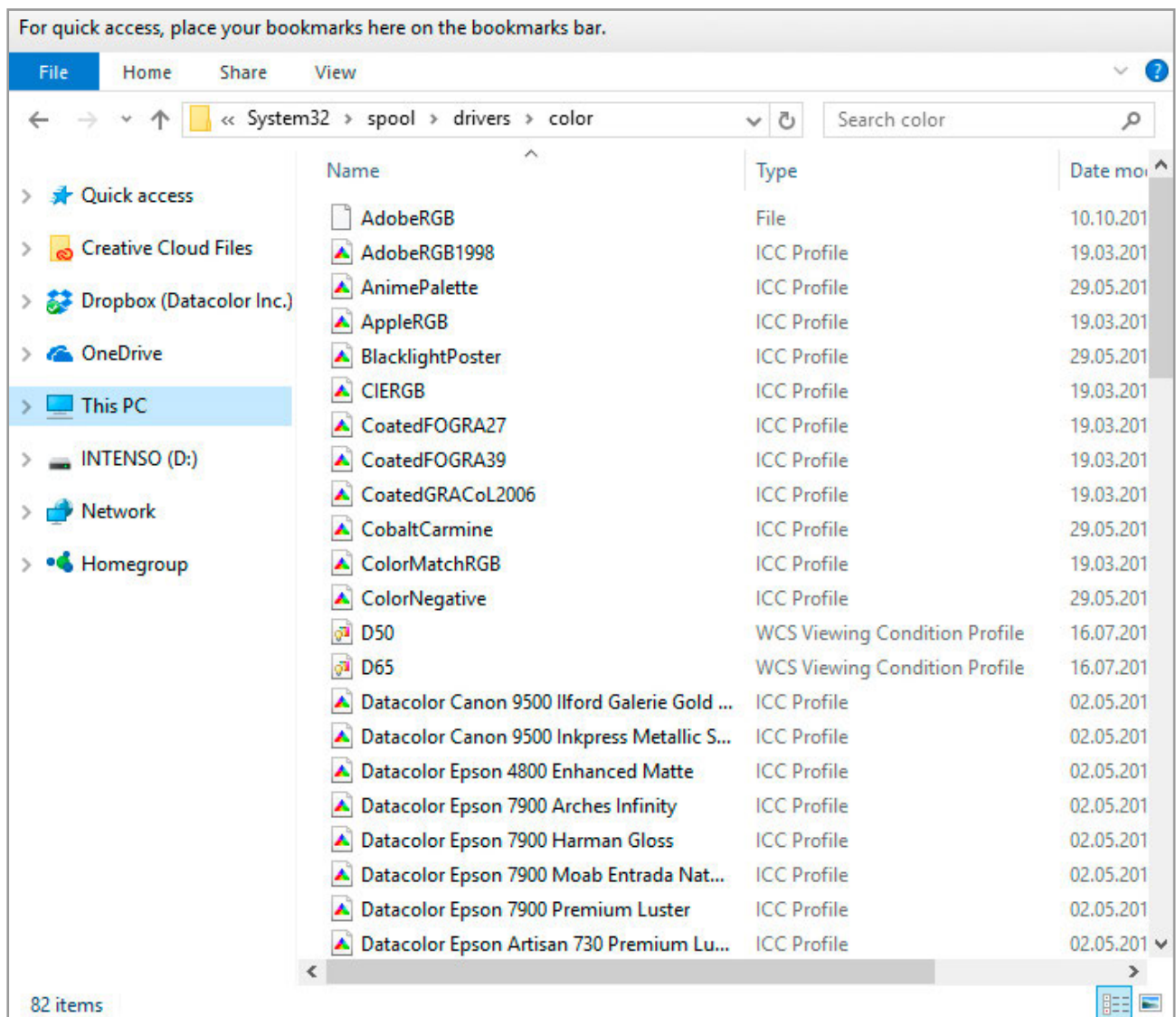
The smart way to proceed

Give your measurement profile a name in this dialog field. We recommend not using the same name or similar names over time. Instead, use the creation date in the file name. Alternatively, you can record information on the lighting conditions in the file name. This will enable you to quickly find the right profile when switching profiles in future. You can also use this to compare a profile with previous profiles to gain an impression of the color variations on your monitor.

Storage Location

Where your profile is saved

On Windows systems, the directory for any ICC profile is stored under “C:\Windows\System32\Spool\Drivers\Color” and for macOS systems, they are stored in the “User/Library/ColorSync/Profiles/” folder. When in doubt, you should restart Windows computers following any manual interventions. You can use the “ProfileChooser” tool in Windows to switch between different Spyder profiles. Profiles can be switched in System Prefs/Displays/Color on the Mac.



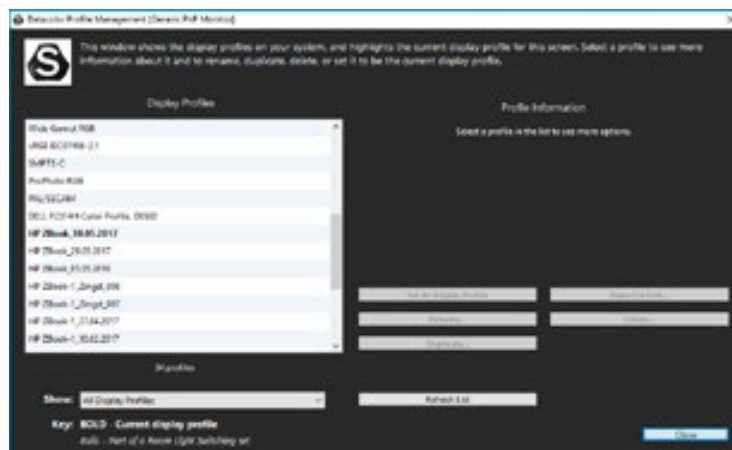
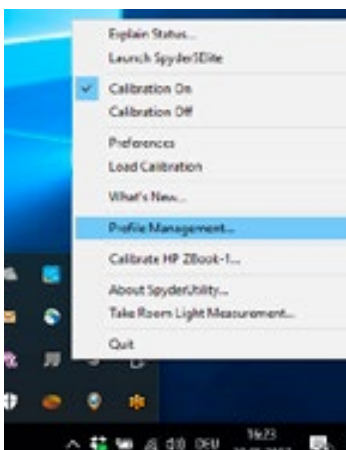
Color profile folder in the “Color” system files folder.

Switching Profiles on Windows

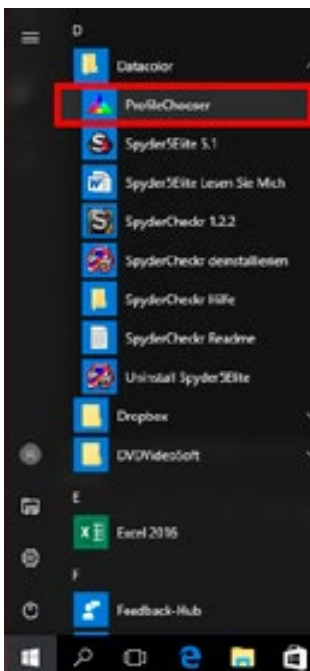
A step-by-step guide

The Spyder5 software automatically archives the color profile generated in the right place in the system so you can switch between profiles.

- To do so, open the add quotations menu and navigate to “Settings>Control Panel>Display” to open the dialog to configure your monitor and select the “Settings” tab.
- Clicking the “Advanced” button will make another dialog appear. Its “Color Management” tab lets you select different profiles. With Win10, this should also update the VLUTs to match the selected profile.
- Alternatively, you can also use the Datacolor “ProfileChooser” tool, to assure VLUTs are updated.



Spyder5PRO+ and Spyder5E-LITE+ offer a profile management tool via SpyderUtility



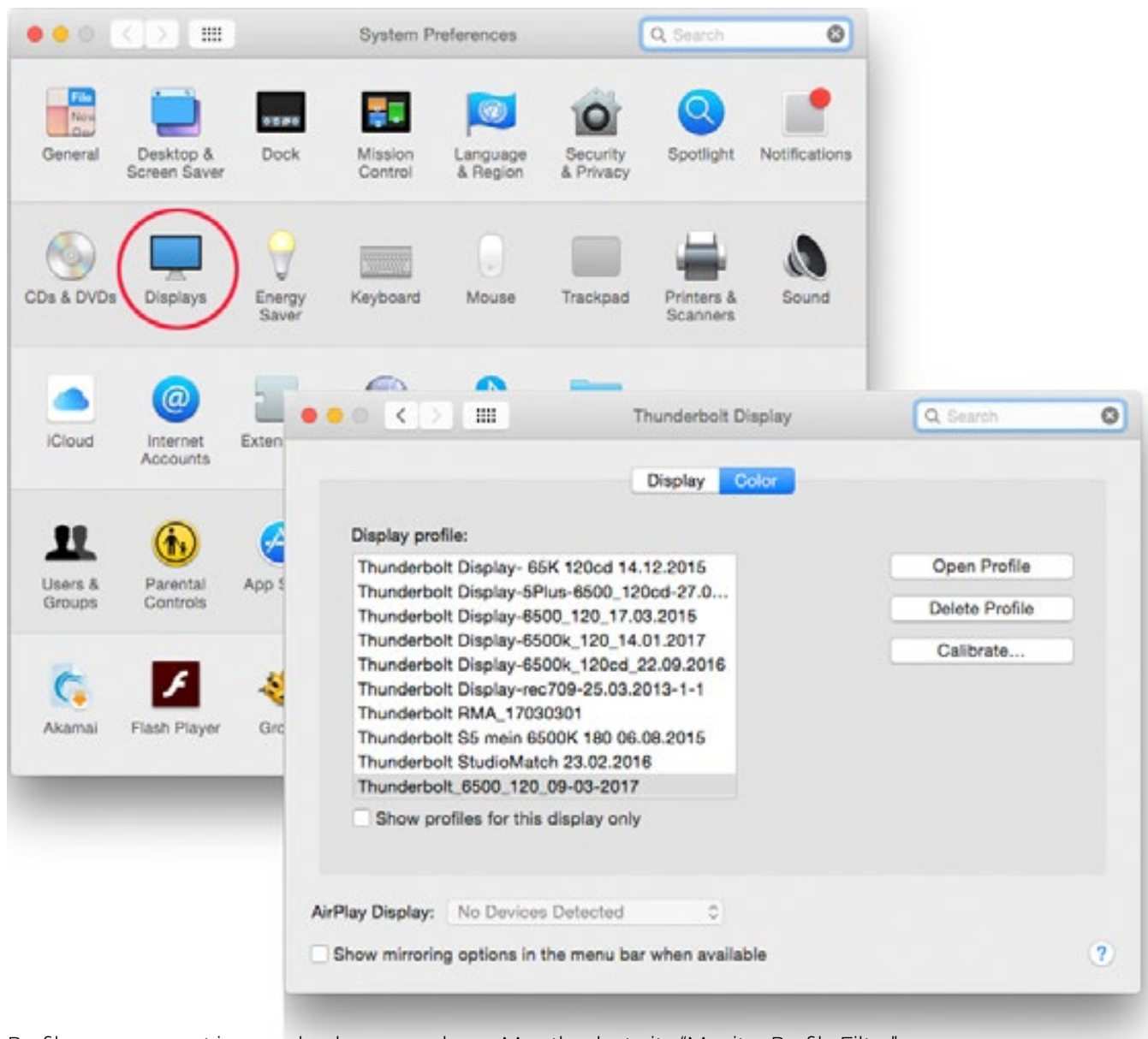
The ProfileChooser is located in the Windows Start menu in the Datacolor folder

Switching Profiles on macOS

How to easily switch profiles

The procedure is more user friendly on a Mac:

- Use the Apple menu to open “System Preferences,” click “Displays” and select the “Color” tab at the top.
- There, click the profile you want to choose and immediately see the effects of this profile setting.



Profile management is very clearly arranged on a Mac thanks to its “Monitor Profile Filter”

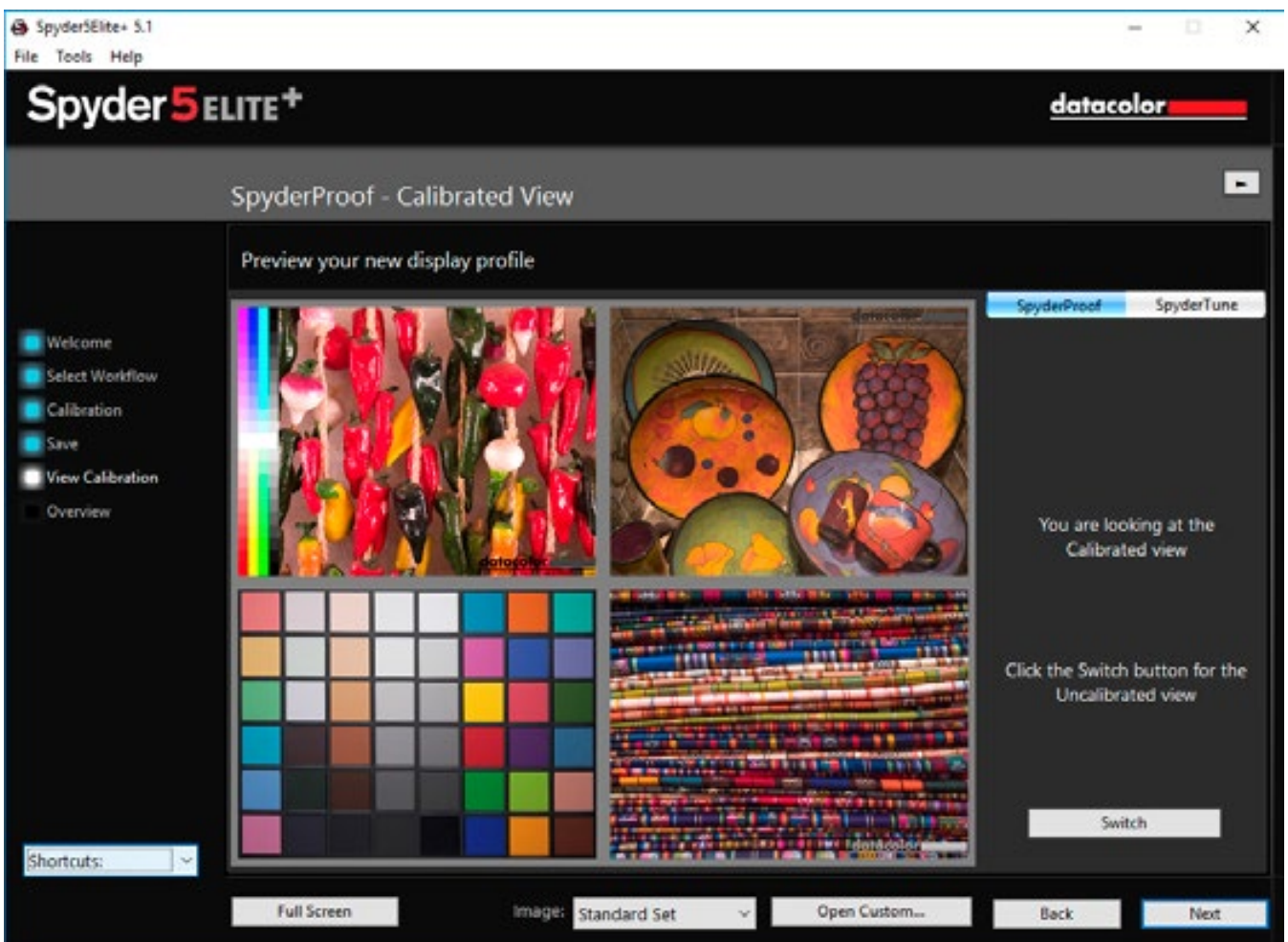
SpyderProof

How to analyze your display's state



INFO

The calibrated state of your display consists of the hardware adjustments you have made to the display, the viewing conditions surrounding your display, and video corrections (VLUTs) applied to your video card, and the ICC profile used by your OS and applications.



The SpyderProof images are not randomly selected, but provide a cross section of typical photographic types.

The “SpyderProof” tool provides you with a series of selected images so you are better able to analyze the state of your display. It is available for each attached display. But how does SpyderProof work?

- The calibrated view first shows you the “after,” i.e. how the image sample looks with your most recent calibration and profile.
- Clicking “Switch” shows the uncalibrated view of the image. But please note: “Uncalibrated” does not refer to the previous calibration and profile, but instead refers to a “zero correction” setting, i.e. it is displayed with your monitor’s native colors. Displaying the image with the previous profile would require also require readjusting all hardware settings to their previous settings, which would be impractical.

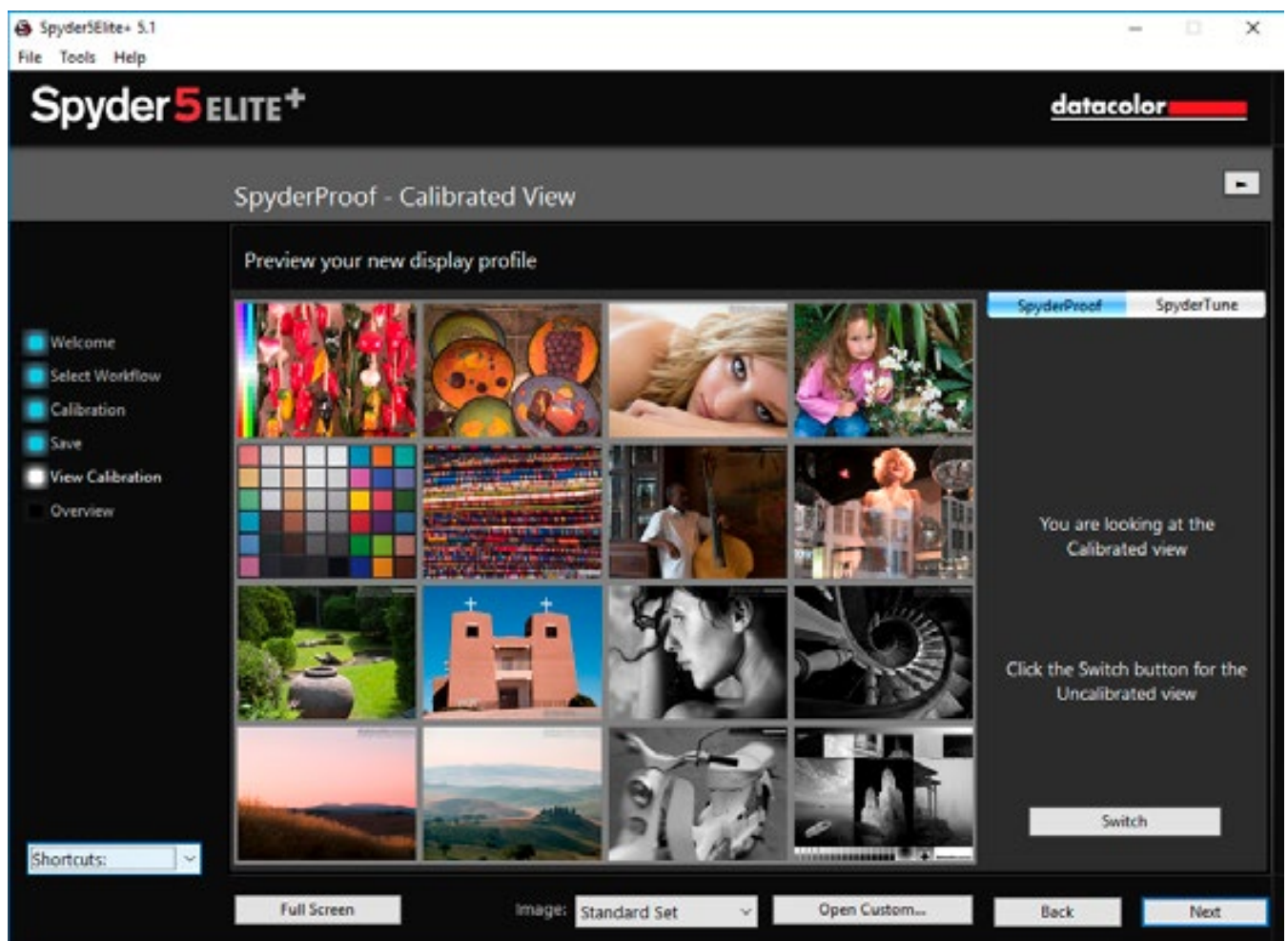


TIP

A calibrated display may appear somewhat unnatural to if your eyes are adapted to the uncalibrated state. Wait a few minutes for your eyes to adjust to the calibrated mode.

How these 16 images can help you

You can use each of these 16 images to view specific characteristics. These are explained in a way that is both detailed and easy to understand in the program's online help section. You can zoom in on the subject areas or "quadrants" with just a click. The first click on the quadrants shows you a zoomed in view of the associated four images. A second click enlarges an individual image so that it fills the field. Clicking "Switch" switches between Calibrated and Uncalibrated.



SpyderProof displays a total of 16 images divided into four quadrants for you to zoom in on: saturated colors (upper left), skin tones (upper right), landscapes and gradients (lower left), and black and white (lower right).

The two most important images

Two of these 16 images are particularly useful when working on photographs:

- The upper left image shows the synthetic step gradients of magenta, blue, cyan, red, yellow, green and black. These gradients are useful when checking the system for any “out-of-gamut” colors. This tells you what color nuances the monitor can display in combination with the profile.
- At the bottom right you’ll find Datacolor’s “B&W test image,” which contains a wide range of photo and graphic elements. Review the enlarged details above each image for highlights and shadows.



These two images cover the main aspects of image analysis.



TIP

The PRO and ELITE versions of Spyder5 enable you to view a before/after view of your own images. To do so, open each image in the SpyderProof tool using the “Custom” button. Clicking on “Switch” switches the view between the uncalibrated and the newly calibrated views. Accessing SpyderProof from the ShortCuts menu at the lower left of the window will display SpyderProof, but until you perform a calibration, and save an ICC profile, no data is available to perform calibrated/uncalibrated comparisons.

Profile Overview

The options offered by the profile overview

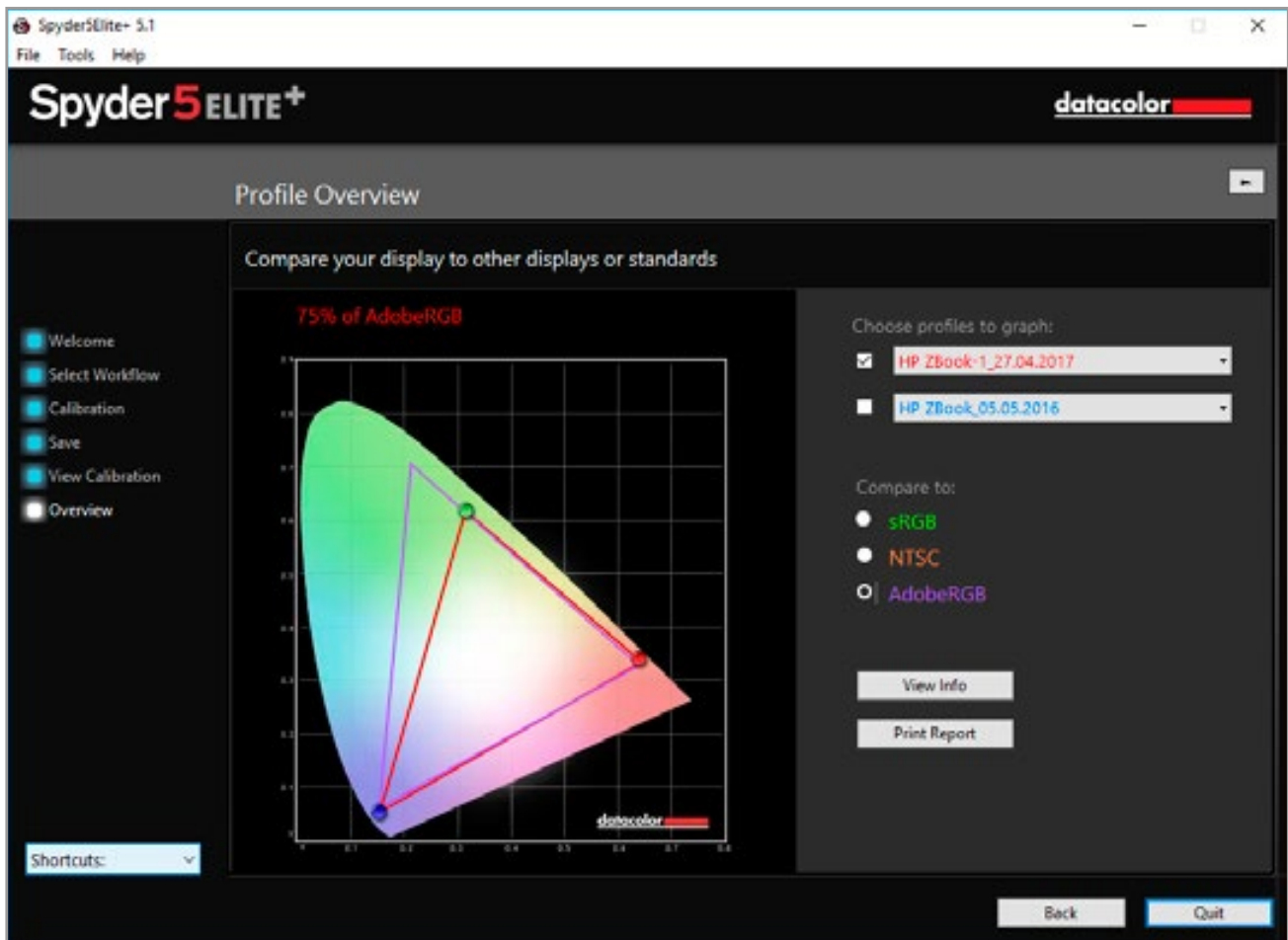
Every monitor calibration ends with a profile overview. You can see the viewable color space for the current display on the screen and compare it with the sRGB, Adobe RGB and NTSC industry standards.



TIP

Your data can be printed for future reference.

Has your profile overview brought up further questions about things like calibrating an entire studio? Read the solutions in “Fine Tuning Your Monitor.”



It's clear to see that the calibrated laptop can only display a color space that is close to the sRGB color space.

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 l'éclairage). 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, 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 defines 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 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 to 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 motif, 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.

Gray balance:

"Achromatic" colors are the gray 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 gray may become brighter or darker, but remains neutral gray. If the color components are no longer in the same proportion, one can immediately perceive a gray tint and 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 is saved to the header of an image file for improved classification. The metadata contains 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.

LookUp table:

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

Glossary

LUT:

See LookUp 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:

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 material has 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 known 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 $2^8 = 256$ 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.

Spyder5 eBook

Color management can be easy

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