Spyder X2 Software
User Guide
(Version 6.0)

Table of Contents

Instrument Specifications

Power Requirements	5V DC, 100 mA, via USB connector plugged into personal computer
Dimensions	Width: 44.8 mm Height: 76.0 mm Length: 79.1 mm Weight: 140g

Environmental Requirements	Operating Temperature:
	    5°C to 40° C
	
	Maximum Relative Humidity:
	    80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
	
	Maximum Altitude:
	    2,000 meters

Agency Compliance	SGS, CSA, C-Tick, CE

This product is to be used only as specified by the manufacturer, and according to the instructions for operation and maintenance provided herein. The protection of the device may be impaired if used in a manner not specified by the manufacturer.

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    Suzhou, Jiangsu
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Introduction

Thank you for purchasing your new Spyder X2 monitor calibrator. This document will guide you through using your Spyder X2 software to get the most accurate color from your display(s).

What's in the Box

- Spyder X2 Sensor
- Serial Number
- Welcome Card with link to software and support resources
- USB-A Adapter

System Requirements

- Windows 10,11 32/64
- Mac OS X 10.14, 10.15, 11 (Big Sur), 12 (Monterey), 13 (Ventura)
- Monitor resolution 1280x768 or greater, 16-bit video card (24 bit recommended), 1GB of available RAM, 500 MB of available hard disk
- Internet connection for software download
- USB-C or USB-A port

Download and Activate Software

Download the software from http://goto.datacolor.com/getspyderx2 and open the file to install.

Plug your Spyder X2 into a direct port on your computer (not on a keyboard, hub, or extension cable). If your computer does not have a USB-C port, use the included USB-A adapter. This cable provides power and communications between the Spyder X2 and your computer.

Open the Spyder X2 application and follow the prompts to activate the software.

Note: Your serial number is located in the Spyder X2 box under the sensor.
A license code is provided after activation on another machine. Please reach out to Datacolor Spyder support to recover a lost license code.

Before you get started
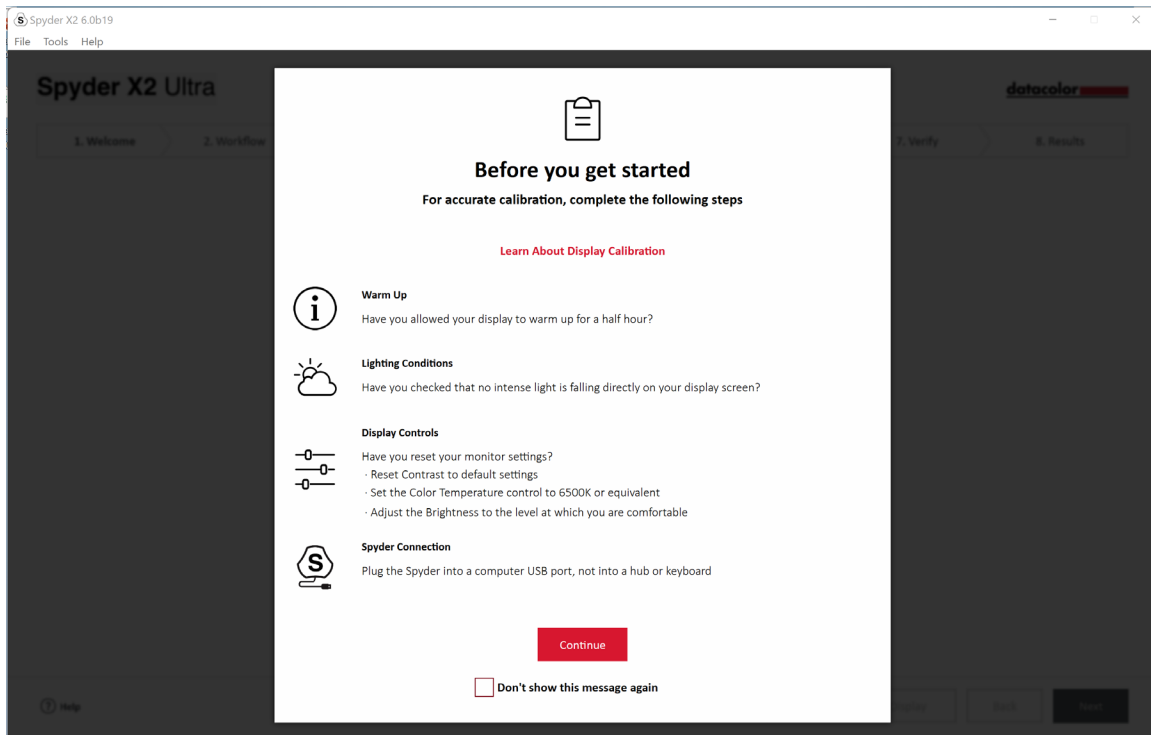
The first screen will provide you with condition reminders before starting a calibration.

- **Warm Up**
  Ensure your display has been powered up for at least 30 minutes prior to doing a calibration.
- **Lighting Conditions**
  Ensure there is no direct light falling on your display as this could have an adverse effect on your calibration.
- **Display Controls**
  If your computer has these controls, set them to the default settings or equivalent and deactivate any auto brightness features.
- **Spyder Connection**
  Ensure your Spyder X2 is plugged into a direct port on your computer. Avoid using a keyboard, hub, or extension cable port as this could prevent the device from getting the proper data flow.

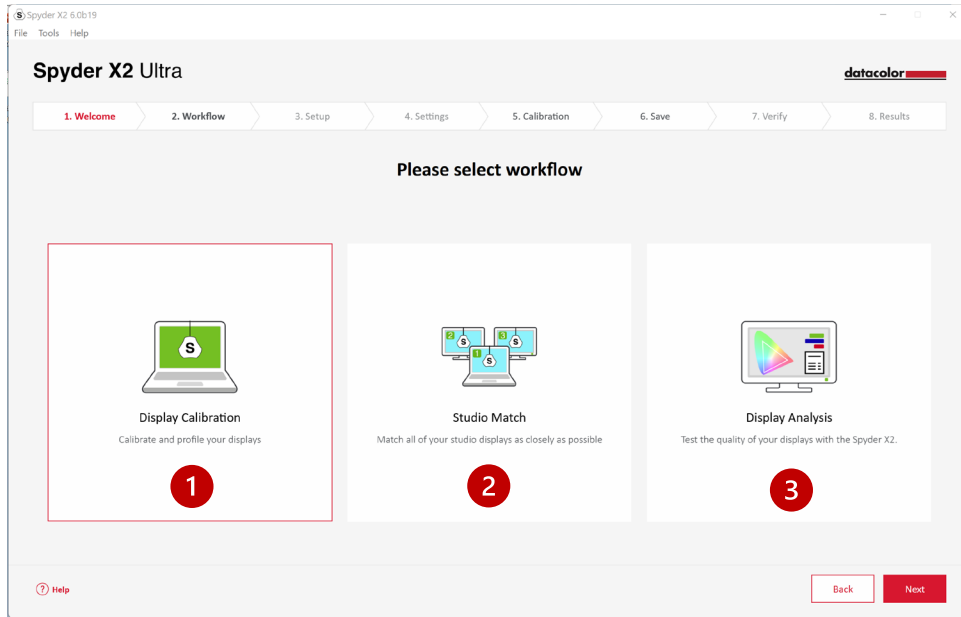Once you have completed these steps, click **Continue**.

Welcome

Choose what you would like to do: **Calibrate My Display(s) (1)** or **Soft Proofing (2)**. Click on your selection and click **Next**.
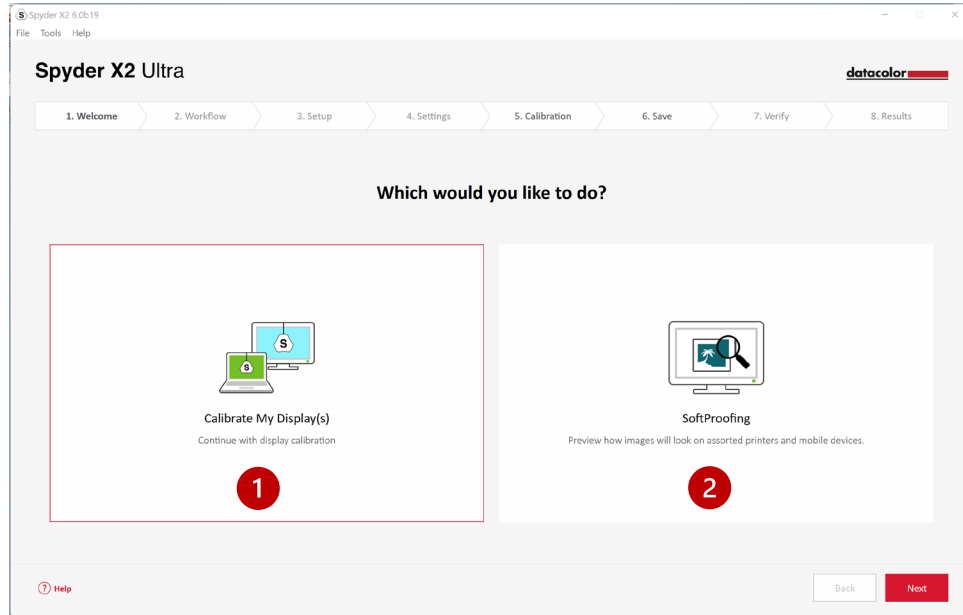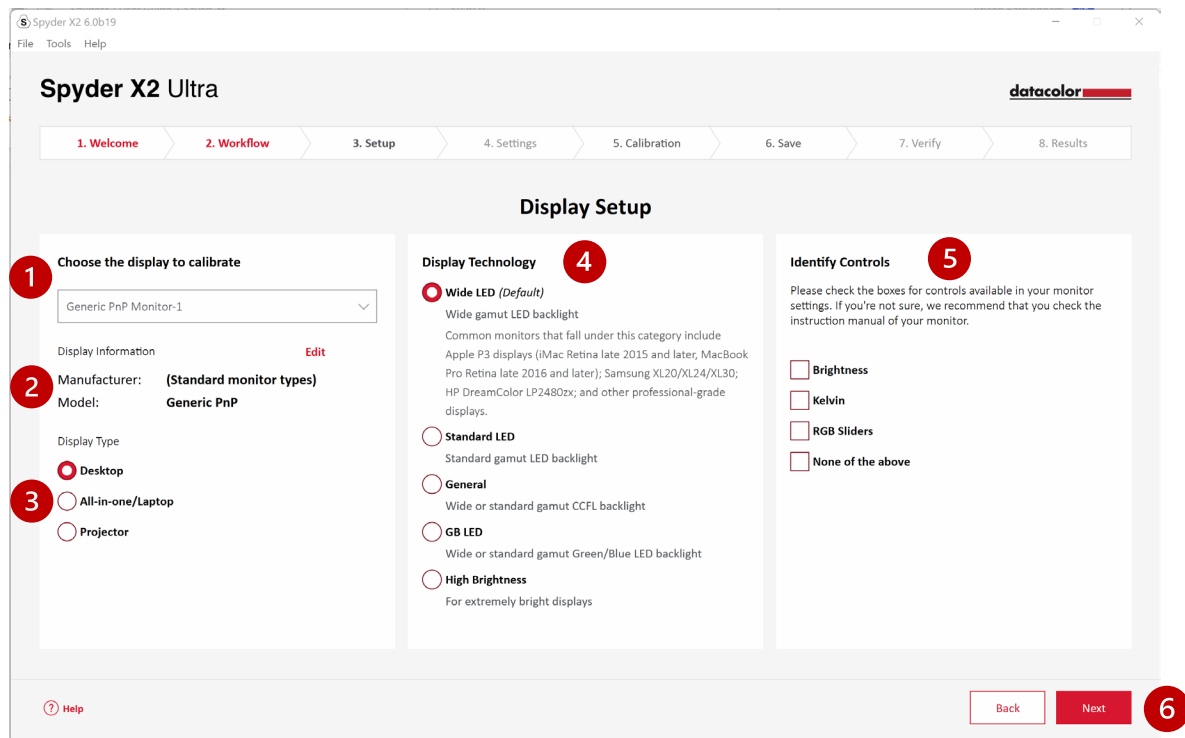
Workflow

Choose a workflow: **Display Calibration (1)**, **Studio Match (2)**, or **Display Analysis (3)**. Click on your selection and click **Next**.

Display Calibration

Display Setup

If you have more than one display connected to your computer, choose the display you want to calibrate from the dropdown menu. The software will automatically move to the selected display.

Ensure the **Display Information (2)** is correct. If not, click **Edit** and change the information.

Ensure the **Display Type (3)** is correct. If not, click on the correct descriptor.

Select the **Display Technology (4)** that best describes your monitor. Clicking on each option will provide a detailed description of each backlight type.

Identity and select (5) the controls available for adjustment on your monitor or select **None of the above**.

Once you have made all the necessary selections, click **Next (6)**.

Calibration Settings

Calibration Type

If this is your first time calibrating this display, you will automatically have Full Calibration selected. On subsequent calibrations you can choose to do a **FullCAL**, **ReCAL**, or a **CheckCAL**.

FullCAL (full calibration) uses the entire sequence of patch measurements to calibrate your screen.
ReCAL (recalibration) uses a subset sequence of patch measurements to update a previously created **FullCAL**.
CheckCAL (check calibration) evaluates the accuracy of your current calibration.
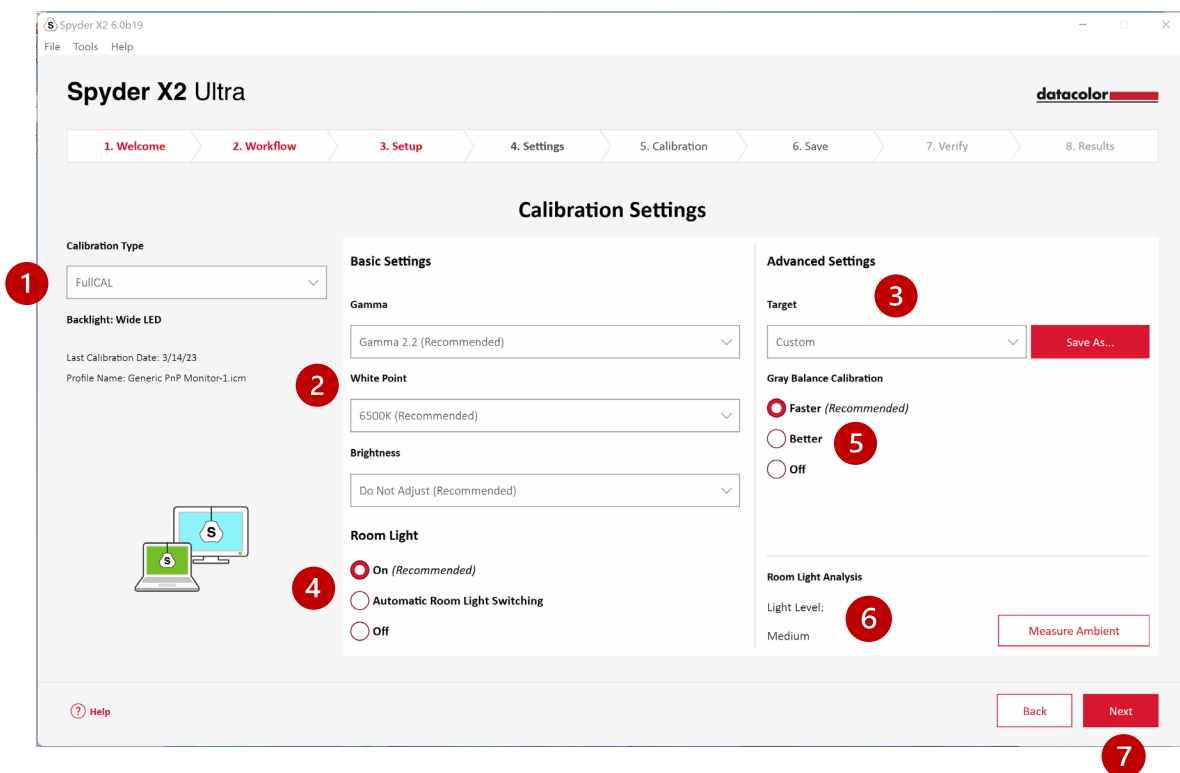
Select your settings for **Gamma**, **White Point**, and **Brightness** from the dropdown menus **(2)**, or select **Other** to type in your own values. You also have the option to select **Target (3)** settings based on industry standards that will change these settings for you from the dropdown menu.

Choose if you want to measure your **Room Light (4)** to help set the brightness of your display properly based on the level of lighting in your room. Selecting **On** will prompt a notification when a room light level change is detected. Selecting **Automatic Room Light Switching*** will create multiple profiles that the software will change between automatically when a room light level change is detected. *Please note, both options require the Spyder X2 sensor to be plugged into your computer to detect the changes in light.*

Choose if you want **Gray Balance Calibration (5)**. **Faster** will do the minimal gray balance required to get a calibration. **Better** will do an iterative gray balance by measuring more target patches to create a more precise calibration. **Off** should only be used when calibrating a front projector.

You also have the option to measure your current ambient light with the **Room Light Analysis (6)**.

Once you have made your selections, click **Next (7)**.

If you selected **Room Light – On (***previous screen***)**, the software will take a reading of your room light. Place the Spyder X2 on your desk and ensure no direct light is falling on your display or the Spyder X2. Click **Next** to measure your current ambient light for recommended target settings based on this measurement. Select to keep the settings you selected on the previous screen or accept these recommended settings. Click **Next**.
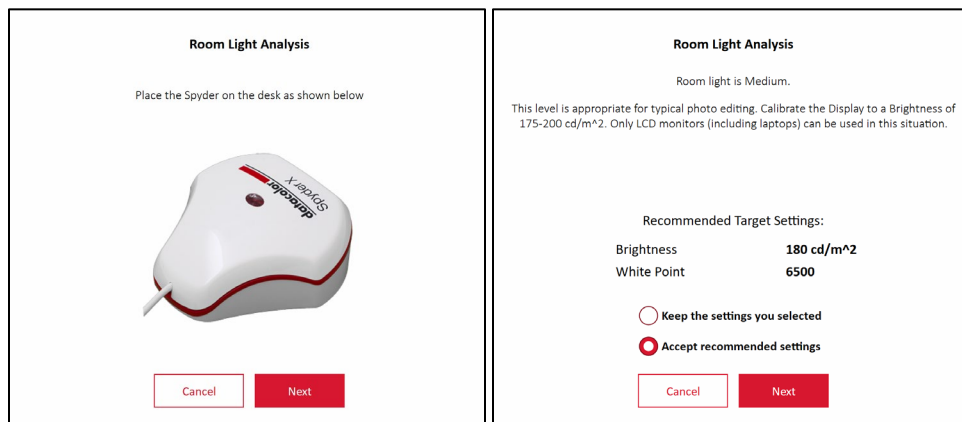
Calibration (FullCAL and ReCAL)
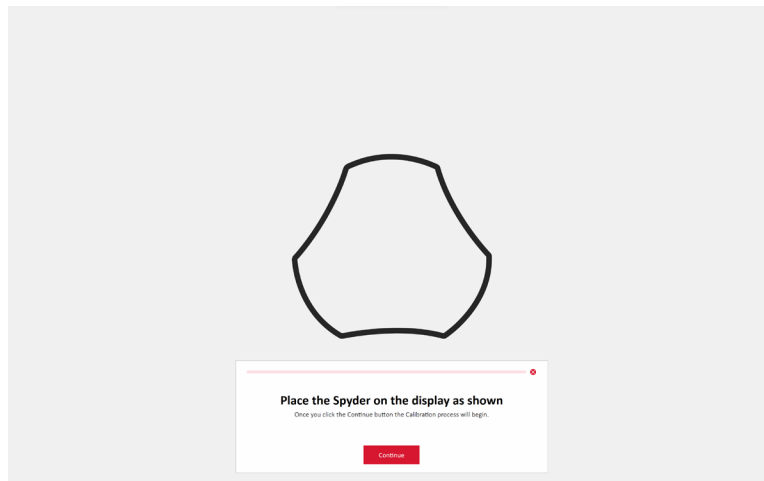
Follow the prompts to place your Spyder X2 on the screen. Remove the cover of the sensor as it is used as a counterweight so that the calibrator remains in place and flat against the screen.

We recommend that you slightly tilt your display back so the unit rests against the screen without you having to hold it in place. Click **Continue**/ **Next**. A series of color patches will flash on the screen.

If you selected any controls on the **Display Setup** screen, the calibration process will ask you to adjust your display to be within recommended levels.
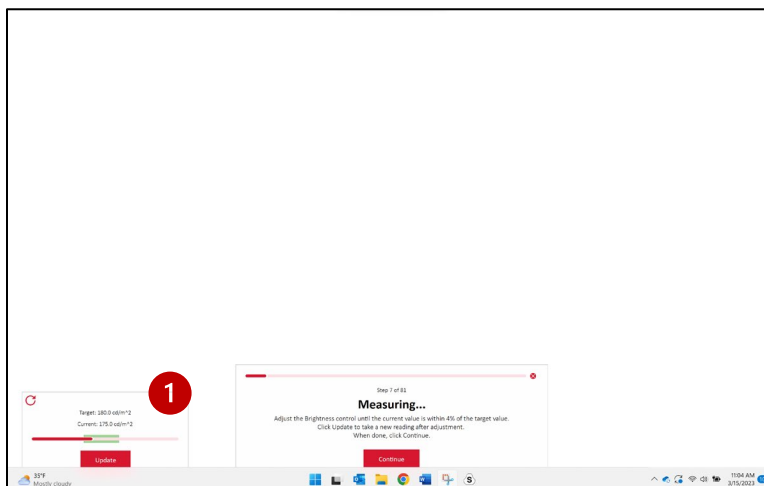
Make adjustments and hit the **Update (1)** button to prompt the software to remeasure. Repeat this process until the **Current (2)** value is as close as possible to the **Target (3)** value.

Note: *The display may not be able to fall within the **Target** range. Adjust to be as close as possible.*
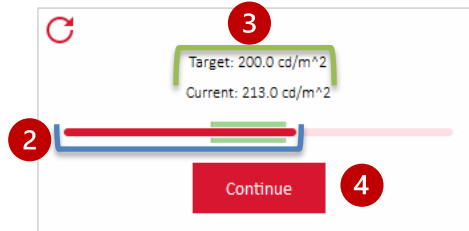
Once you have completed your adjustments, click **Continue (4)**.
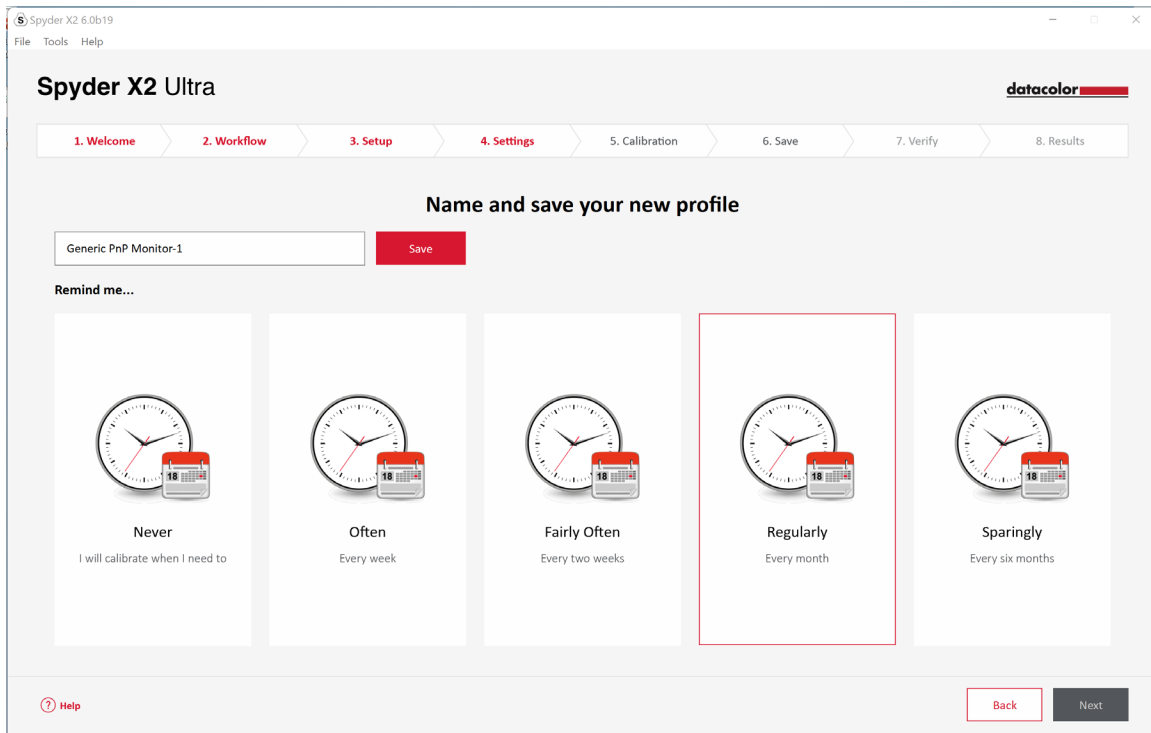Once the calibration measurements are completed, click **Finish**.

Save profile

Enter the name you would like to save the profile as. Here is a sample file name we think works best to keep an archive of your monitor profiles:

"Make_Model_yyyymmdd(date)_ver1"

You can also set a reminder of when to recalibrate your display, we recommend once a month.

Click **Save** then **Next**.

CheckCAL

A CheckCAL will quickly see if your display needs calibration. Follow the prompts to place the Spyder X2 on the screen and take measurements of a small amount of color patches. When finished, a report will be generated to confirm if the current settings match your target settings. Green check marks denote a pass, and red X marks denote a value out of the acceptable range and recalibration is recommended. Click your choice to **Recalibrate** or continue with **Next**.
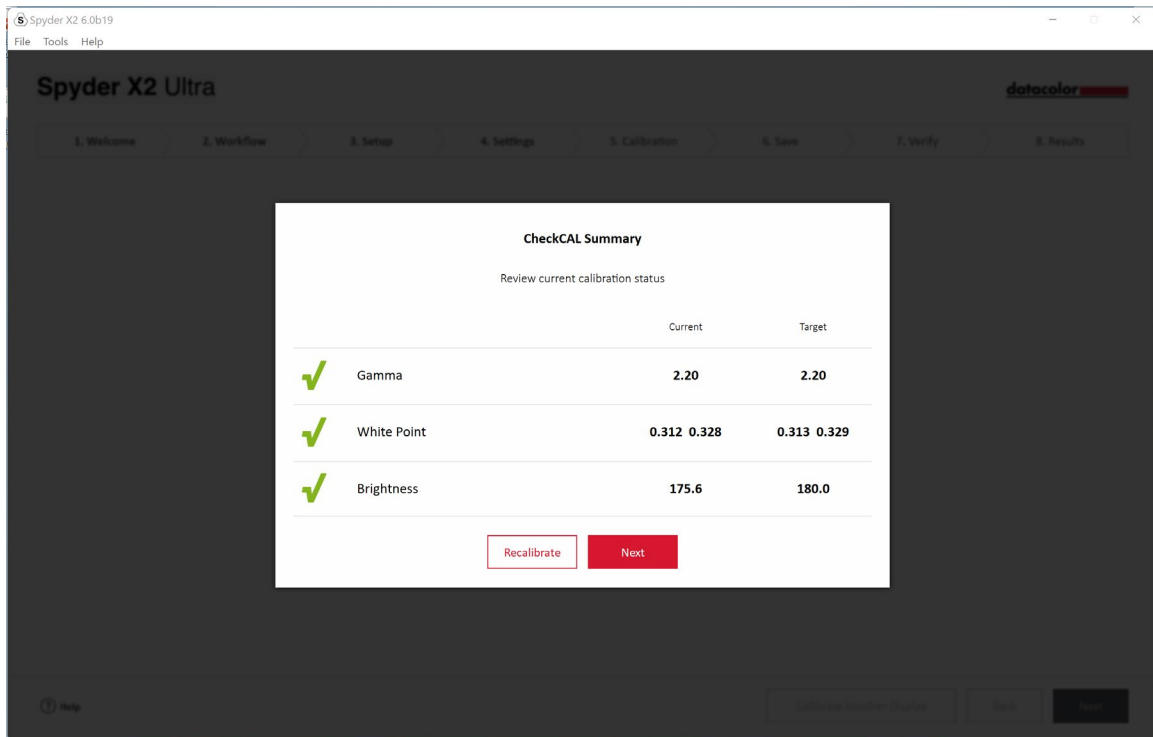
SpyderProof

Review the calibration results by comparing images in **Calibrated** and **Uncalibrated (1)** view by clicking the toggle.
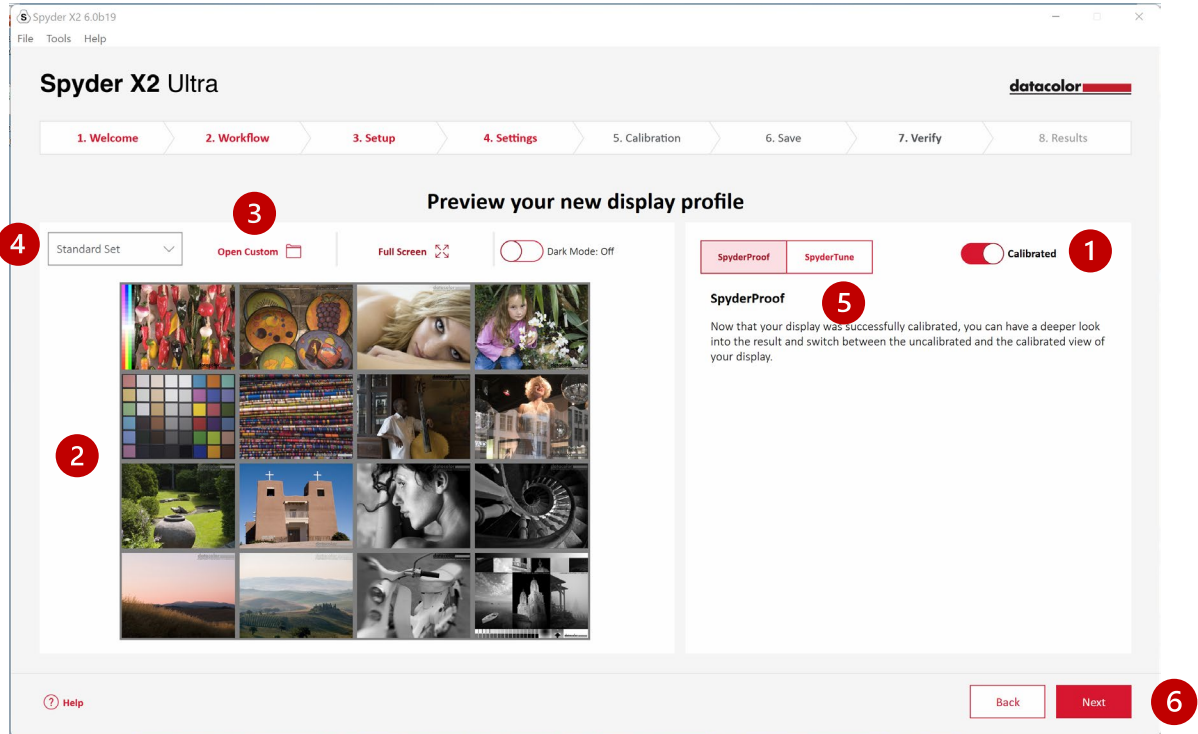
You can click the image to zoom in for more detail.

Click **Open Custom (3)** to choose a .tiff or .jpeg image from your computer files for review.

Choose from the **dropdown menu (4)** to switch between the **standard set** image or your **custom** image.

Click **SpyderTune (5)** or **Next (6)**.

SpyderTune

These settings should only be changed if you want to match multiple monitors with different backlight technologies, as it will change the precise correction done by the Spyder X2 calibration.
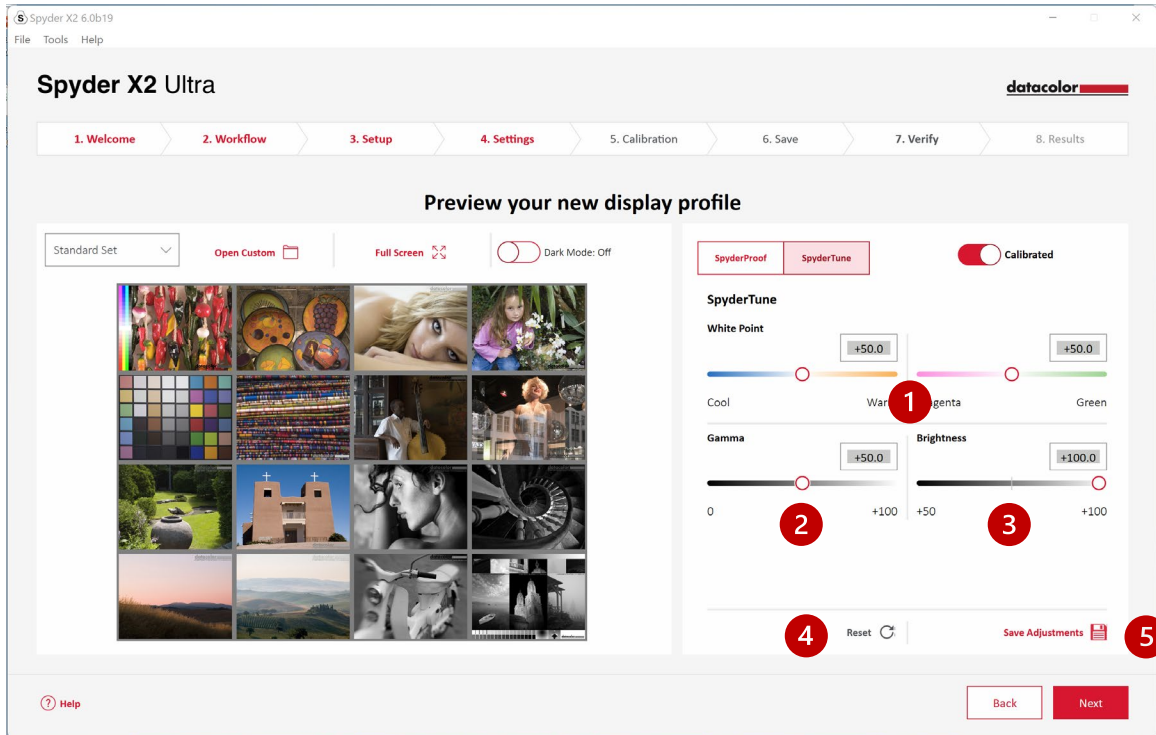
If you are using multiple displays and they work with different backlight technologies and different panels, matching them can be difficult and a compromise to match the screens may be required to achieve alignment. **Only use SpyderTune if absolutely necessary.**

You can change the **White Point (1)** from **Cool** to **Warm** and from **Magenta** to **Green**. You can also change the intensity of the **Gamma (2)** and **Brightness (3)**.

We recommend using the better display as the standard and only tune the other display profiles to match the standard view. If you made a mistake, you can click **Reset (4)** to reset the sliders to the original state of the Spyder X2 calibration.

Once you have completed your adjustments, click **Save Adjustments (5)**.

Click **Next**.

Profile Overview

View your display gamut and compare to industry standards or profiles you previously made.

Click **Quit (1)** if you have completed your calibration(s) or **Calibrate Another Display (2)** if you have another display connected to this computer that you want to calibrate.

StudioMatch

Choose the displays you want to match as closely as possible with calibration. If you are matching displays from another machine, enter the **Lowest Brightness Value**. If you haven't calibrated the other machines yet, leave this blank.
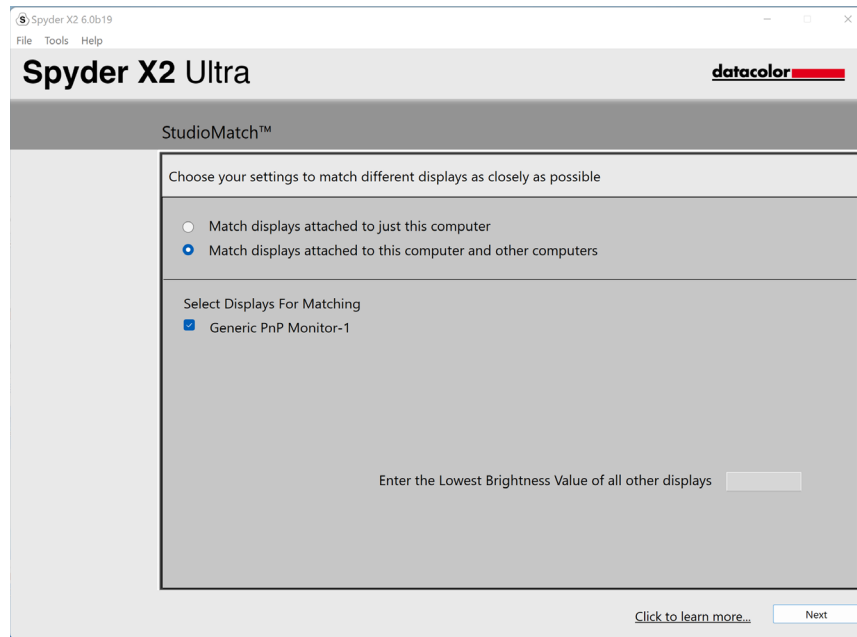
Click **Next** and follow the prompts to place your Spyder X2 on the screen to measure maximum brightness of your connected monitors. Ensure your brightness is set to its maximum before clicking **Measure**. Click **Finish**.
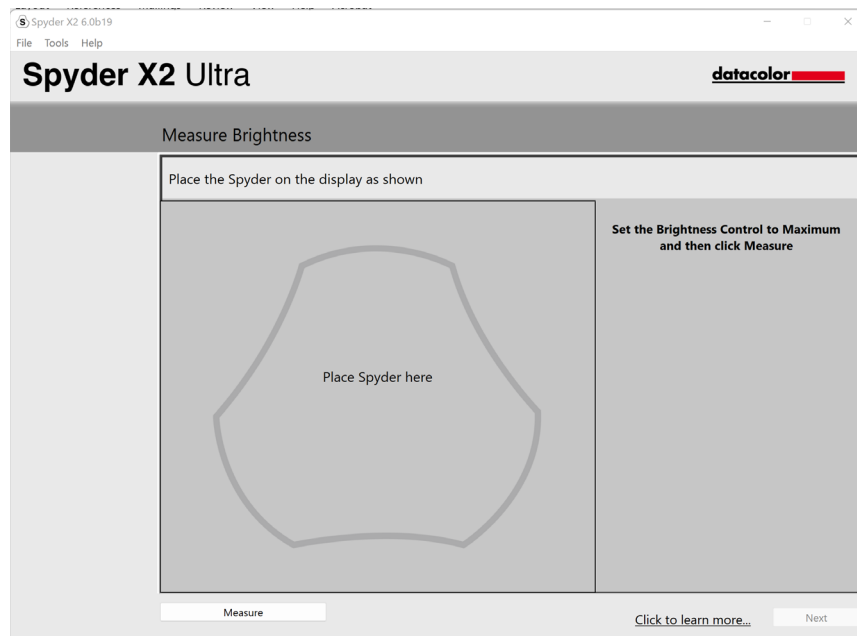
The software will take a reading of your room light. Place the Spyder X2 on your desk and ensure no direct light is falling on your display or the Spyder X2. Click **Next** to measure your current ambient light for recommended target settings based on this measurement.
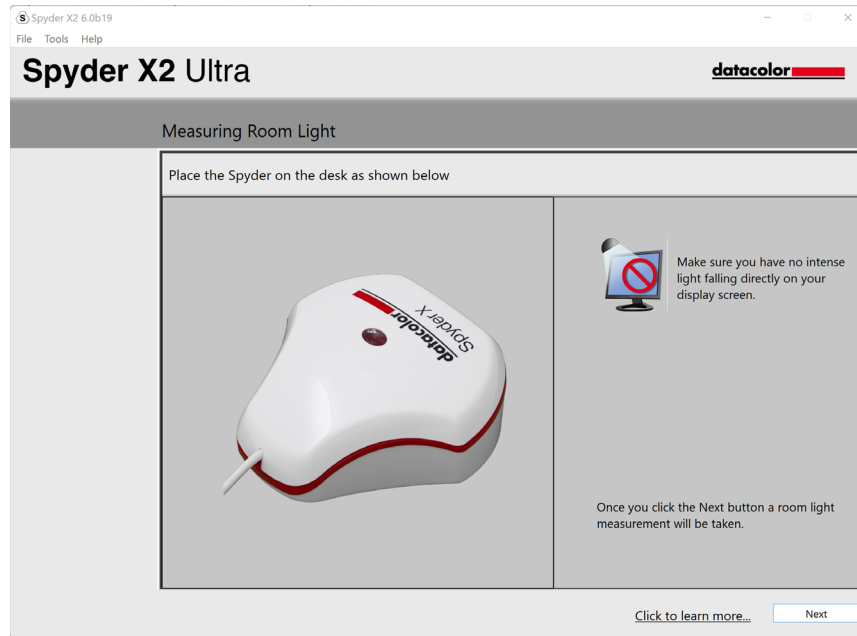
You can keep these recommended settings or select values from the dropdown menus. Remember the **Targeted Brightness** value if you are going to match displays from another machine. Click **Next**.
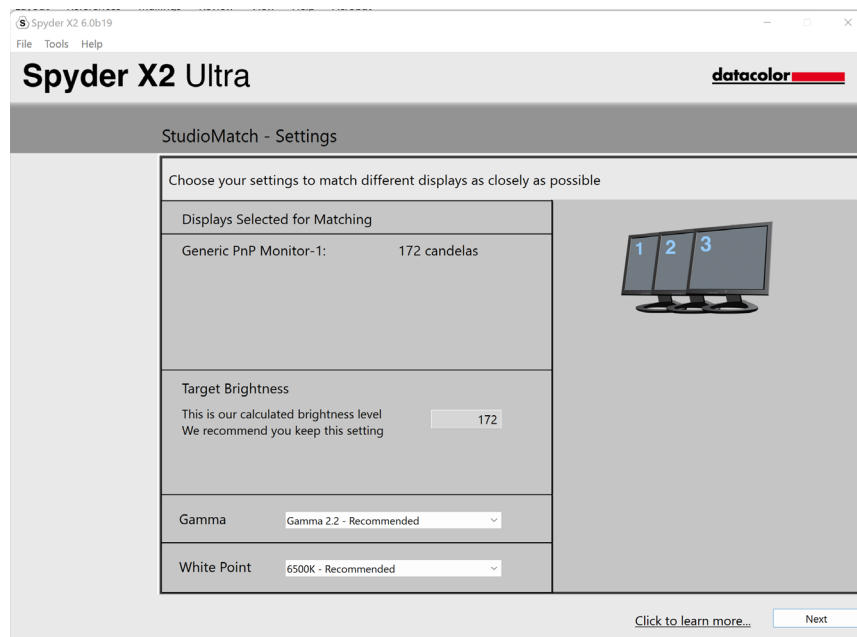
Click **Save** to create the target file. You will see the file's save location to use if you are going to match displays from another machine. Click **Next**.
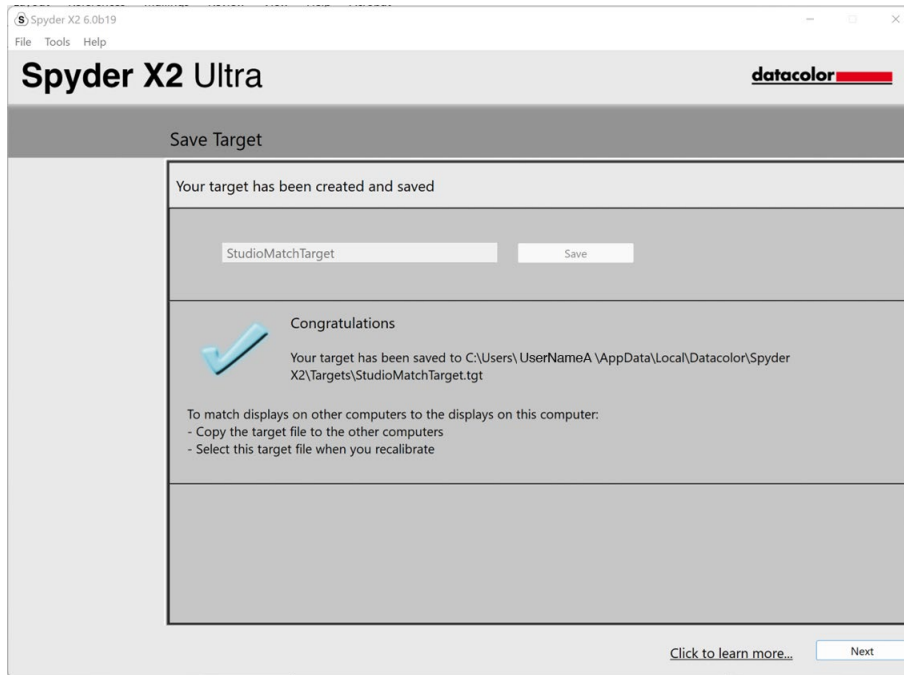
The calibration process will begin. Follow the prompts and move the sensor to each display connected to your system when needed.
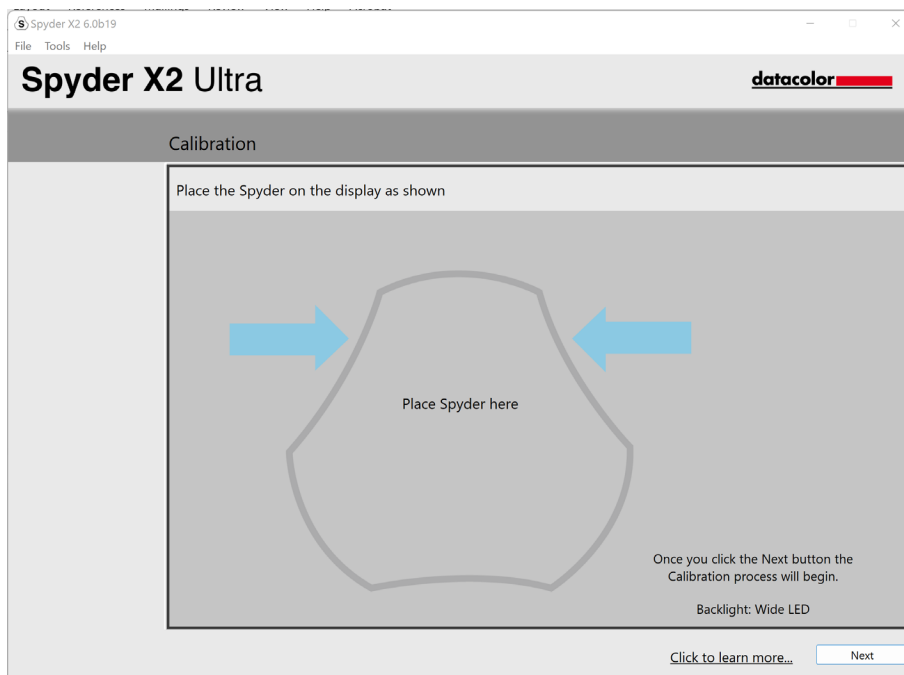
Display Analysis

Run a series of 6 tests on your monitor to see its strengths and weaknesses.
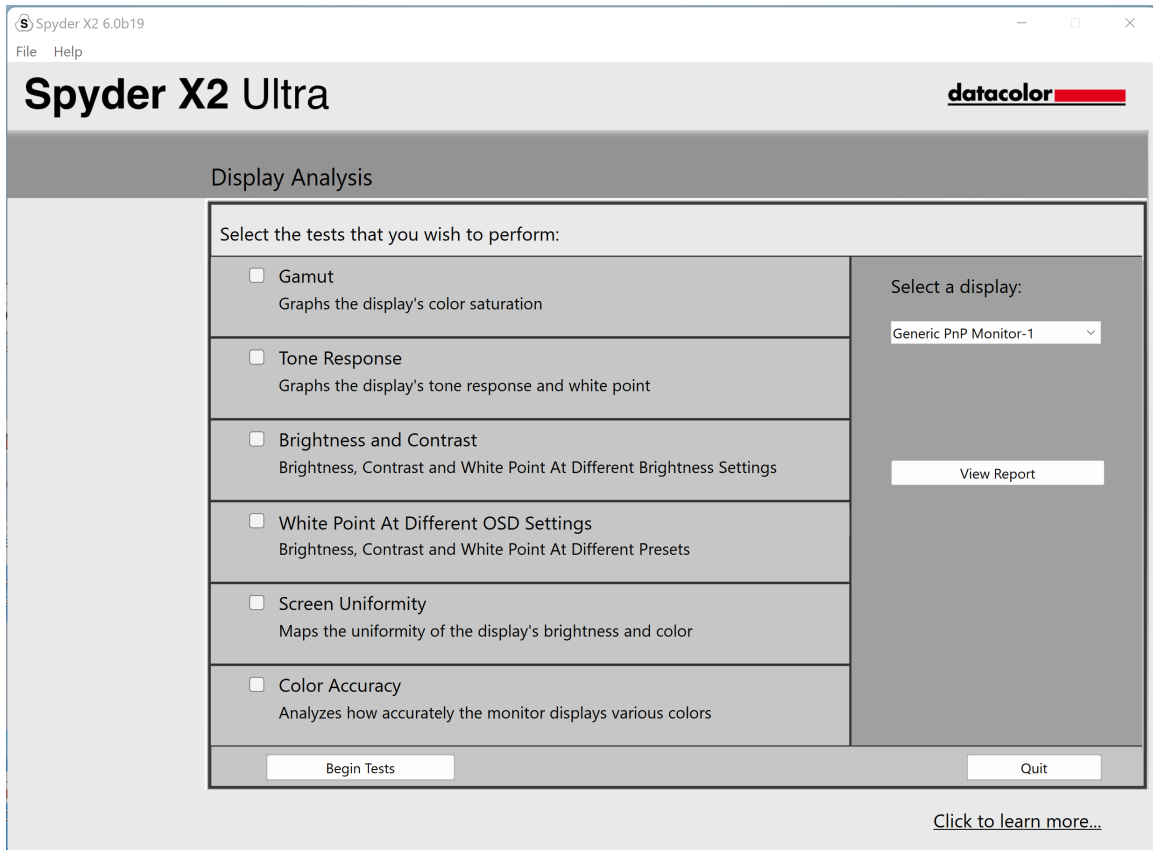
Select the tests you wish to perform and click **Begin Tests**. Follow the prompts to place the sensor and change the brightness on your display.

*Note: All tests other than **Color Accuracy** are performed with the current display profile disabled, to show how your display behaves in an uncalibrated state.*

When performing the Brightness and Contrast test, the first portion of the test will have you set your display to 0% brightness. Once you click **Measure** it will take about 10 seconds to perform the test. As your screen will be fully dimmed it will be difficult to see when the test is complete, please wait about 10 seconds before turning the brightness up to continue.

Once finished, select **View Report** to see the results of all the tests you selected.

SoftProofing

Improve "Screen-to-Print" matching with this workflow of tools to simulate how your photos will look on any printer or device – including home printers, online or retail printers, and certain mobile/tablet devices.

If you are using a home printer, you may already have ICC profiles installed on your computer. If you don't and would like to profile your printer, we recommend using our SpyderPRINT product.

If you want to SoftProof for a retail or online print provider, go to and search their website for ICC printer profiles to download.

Click **Add Folder** or **Add Files** to add .tiff or .jpeg images to the SoftProof list.
Select a profile from the **Device to Simulate** dropdown.
The preview area will simulate your selected image from the SoftProof list using the selected profile.
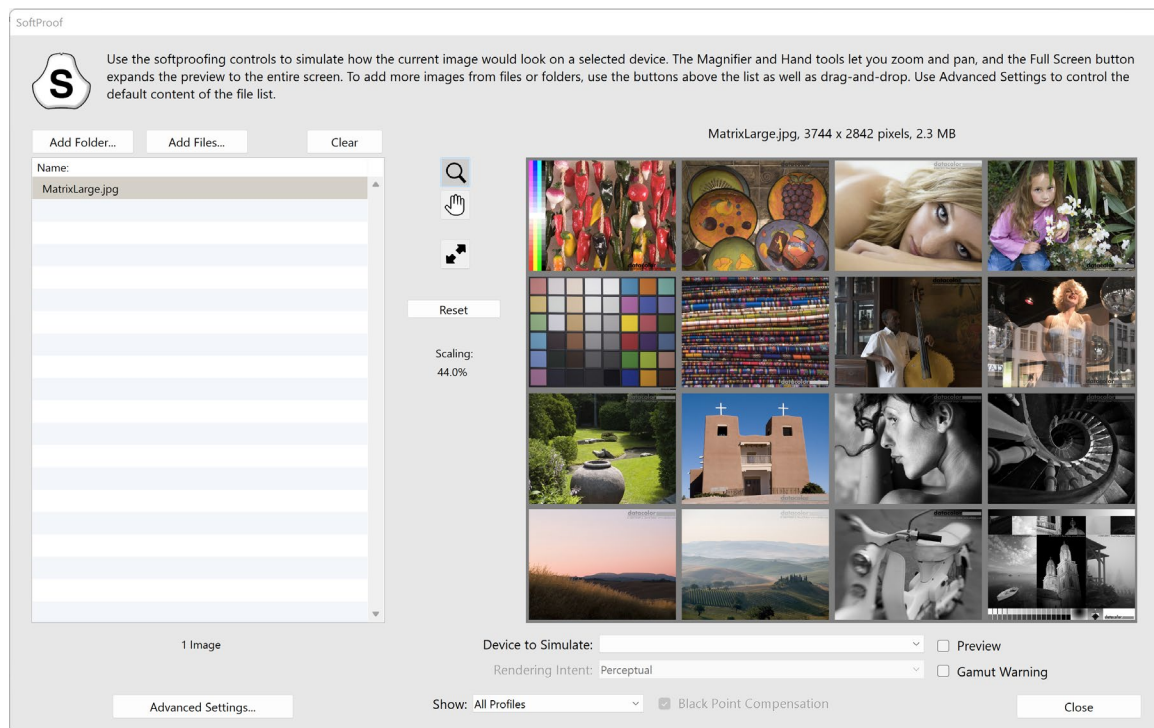
SpyderUtility

Profile Management Tool

Have complete monitor profile flexibility and control with this tool that allows you to turn off, switch, delete, and rename existing profiles.
Click on the SpyderUtility icon in the menu bar/system tray and click **Profile Management**.
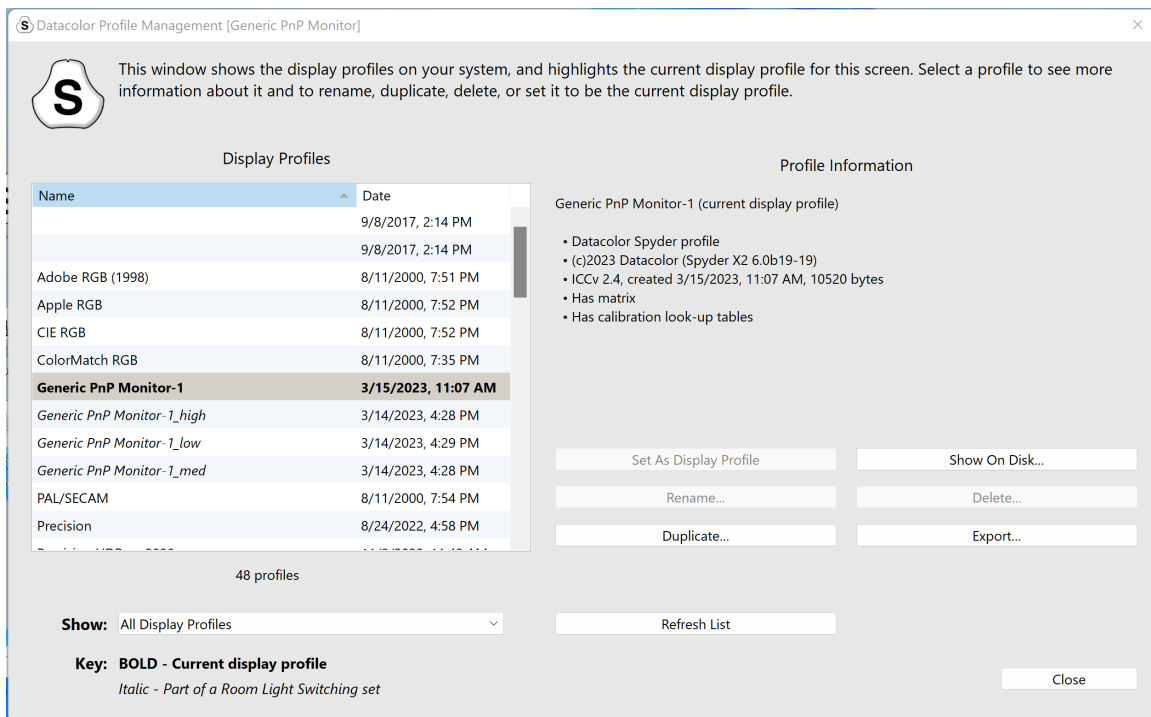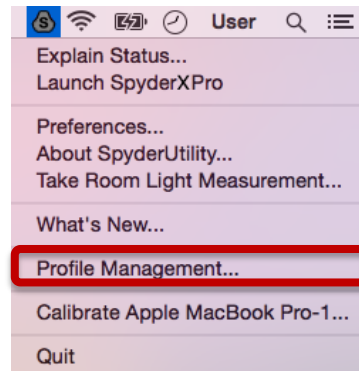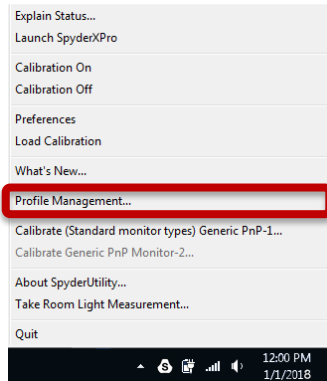
1-Click Calibration

A recalibration can also be performed using the '1-click calibration method'. Click on the SpyderUtility icon in the menu bar/system tray. Then select the monitor you would like to calibrate. Complete the calibration process as you would normally.
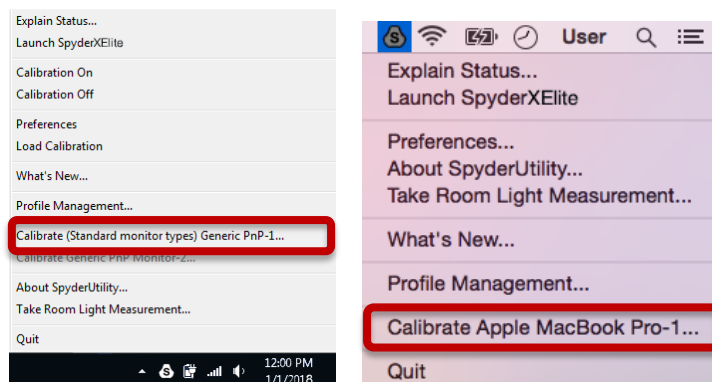
Note: 1-Click Calibration is only available for your monitor(s) after you have completed a full calibration in the software.

Appendix

Tools

Curves

Compare the different gamma and white point adjustment parameters of your display in the form of a graphical curves.
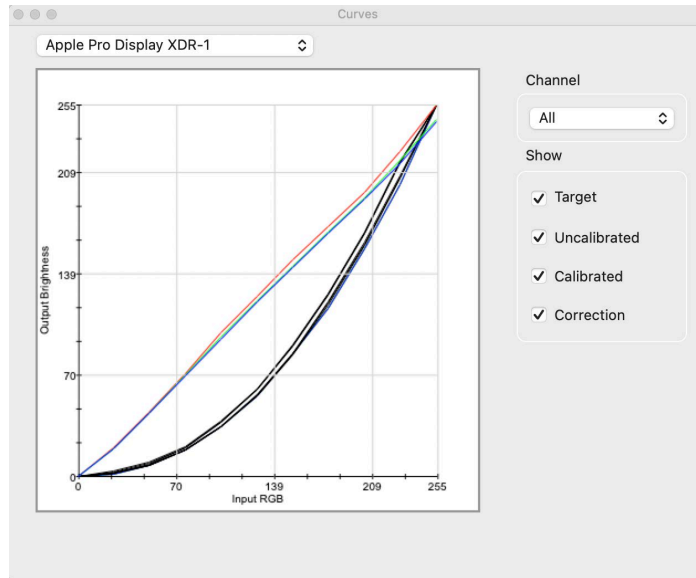
Information

View a report of absolute values for the current calibration of the selected display.

Colorimeter

Use your Spyder X2 to measure any RGB color on the screen.
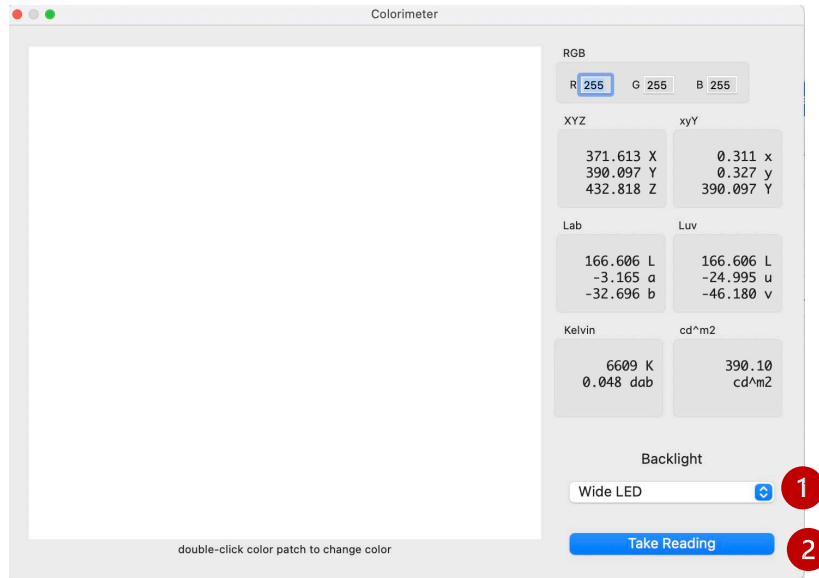
Use the **Backlight (1)**popup to select which backlight setting will be used when taking measurements.

After typing in your RGB values, place your Spyder X2 on the color patch in the window and select **Take Reading (2)** . The results are displayed in different sets of coordinates.

History

You'll typically change the Brightness settings of your display to match a Brightness target setting from the Calibration Settings screen. This window shows you luminance data measured during your display calibrations.

Spyder History

Select the Display you want the History Information for...
Davids-MacBook-Pro-14.local_27EP950-1_History

Display Name: 27EP950-1

Luminance Graph | Detailed Data...

Time of Calibration

White Delta Y Average: 2.4

White Delta xy Average: 0.006

Red Delta xy Average: 0.025

Green Delta xy Average: 0.009

Blue Delta xy Average: 0.01

Use the dropdown to switch between displays which have saved calibration results for your computer. Switch between the **Luminance Graph** and **Detailed Data...** to see the history as a graph or numeric values.

Spyder History

Select the Display you want the History Information for...
Davids-MacBook-Pro-14.local_27EP950-1_History

Display Name: 27EP950-1

Luminance Graph | Detailed Data...

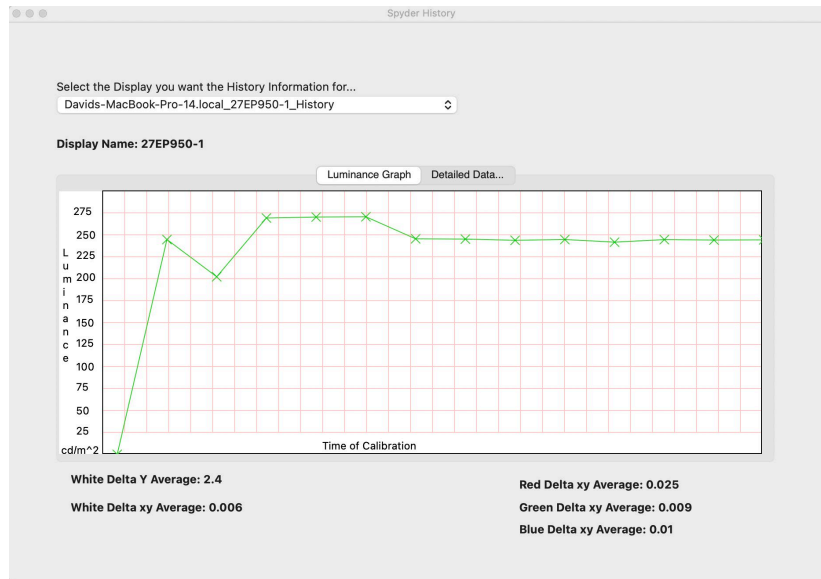| Date	White Luminance Y	White xy	White Kelvin	Red xy	Green x
4/4/23 12:04 PM	244.6	0.311, 0.319	6700K	0.682, 0.311	0.235, 0.70
4/4/23 12:10 PM	202.2	0.31, 0.318	6700K	0.681, 0.312	0.235, 0.70
4/4/23 12:16 PM	269.1	0.312, 0.32	6600K	0.68, 0.312	0.235, 0.70
4/4/23 12:18 PM	270.2	0.313, 0.334	6500K	0.678, 0.313	0.23, 0.71
4/4/23 12:19 PM	270.5	0.313, 0.334	6500K	0.677, 0.314	0.23, 0.71
4/4/23 12:22 PM	245.4	0.308, 0.32	6800K	0.647, 0.325	0.229, 0.
4/4/23 12:27 PM	245.1	0.312, 0.332	6500K	0.648, 0.324	0.23, 0.70
4/4/23 12:32 PM	243.7	0.31, 0.318	6700K	0.648, 0.321	0.234, 0.69
4/4/23 12:34 PM	244.6	0.312, 0.324	6600K	0.65, 0.328	0.235, 0.69
4/18/23 2:10 PM	241.6	0.312, 0.324	6600K	0.649, 0.321	0.234, 0.69
4/18/23 2:20 PM	244.5	0.313, 0.333	6500K	0.648, 0.323	0.23, 0.70
4/18/23 2:25 PM	244.0	0.311, 0.319	6700K	0.648, 0.322	0.234, 0.69
4/18/23 4:58 PM	244.2	0.311, 0.32	6700K	0.648, 0.321	0.234, 0.69

White Delta Y Average: 2.4

White Delta xy Average: 0.006

Red Delta xy Average: 0.025

Green Delta xy Average: 0.009

Blue Delta xy Average: 0.01

Edit Curves

Adjust the **Calibrated** curve using the arrows **(1)** below the graph to change each control point.
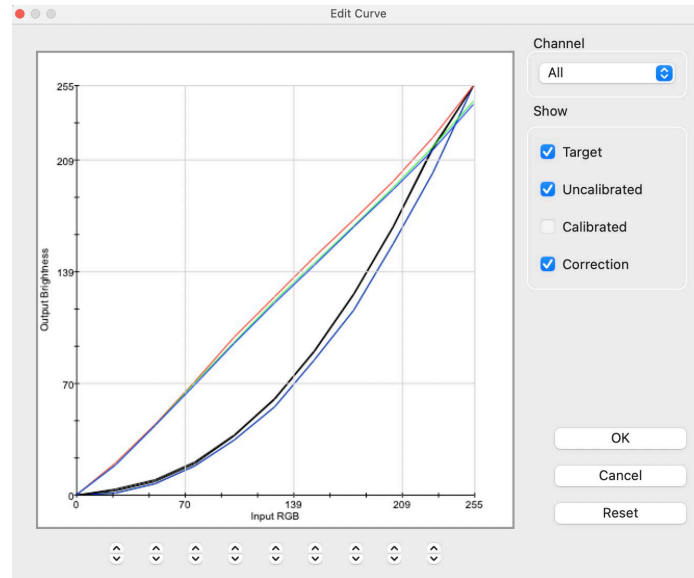
As you adjust the shape of the **Calibrated** curve, you'll see the effect of these changes in real time on your calibrated display.

Click **OK** to save the results into a Target (.tgt) file and use as a gamma calibration target in the future.

Glossary of Terms

AdobeRGB
Default color space for computer displays.
Ambient Light
Light from any source, other than the display, that reaches the screen surface.
Brightness
Amount of light radiating from the screen.
Calibrate
To measure and correct by comparison with a standard, of the correct value or each reading on a measuring instrument.
Candela
Basic unit of luminous intensity.
Color Temperature
Measurement of the color of white light, expressed in degrees Kelvin. The color temperature is the color of light a perfect black-body radiator emits when heated to the temperature. Computer monitors typically have a color temperature of 5000-9300 Kelvin: 5000 Kelvin is a yellow-white, 9300 Kelvin is a blue-white and 6500 Kelvin is a standard white point that matches daylight at noon.
Contrast
Difference in color and/or brightness of an image and other images within the same field of view.
Curves
Graph of tonal response characteristics in the display.
Gamma
Non-linear operation used to code and decode brightness values in an image.
Gamut
Refers to the complete set of colors which can be reproduced/captured by a device.
Kelvin
Kelvin scale is a measure of temperature, starting from absolute zero.
Luminance
Amount of light emitted or reflected from a surface.
NTSC
Default color space for television.
OSD
Abbreviation for "On-Screen Display".
Profile
Data file used to define and match color.
Room Light
(See *Ambient Light*.)
Saturation
Intensity of a color, expressed as the degree to which it differs from white. Can also be described as vividness or richness of a color.
sRGB
Default color space for the Internet.

Tone
Lightness, brightness or value of a patch in an image: dark tones correspond to shadows, light tones correspond to highlight areas.
White Point
(See *Color Temperature*.)

FAQ's

1. **What does calibrate mean?**

   To measure and correct by comparison with a standard, of the correct value or each reading on a measuring instrument.

2. **What is a profile?**

   A data file that describes the color behavior of a physical device (such as a scanner, monitor, or printer) or that defines the color of an abstract color space (such as Adobe RGB or ColorMatch RGB) in terms of a device-independent color model (such as CIE LAB or CIE XYZ). Used by color-management systems to define and match color.

3. **What is the Curves window?**

   It provides a graphical display of the tonal response characteristics of the monitor system. This includes representations of the monitor's default behavior, the desired behavior and the actual behavior.

4. **What does color temperature mean?**

   It is a measurement of the color of white light, expressed in degrees Kelvin. (The Kelvin scale is a measure of temperature, starting from absolute zero.) The color temperature is the color of light a perfect black-body radiator emits when heated to the temperature. Computer monitors typically have a color temperature of 5000-9300 Kelvin: 5000 Kelvin is a yellow-white, 9300 Kelvin is a blue-white and 6500 Kelvin is a standard white point that matches daylight at noon

5. **What is native white point?**

   The native white point is the color temperature that the monitor hardware exhibits without any software calibration applied. With some monitors it can be adjusted with front panel controls, with others, it is fixed, and can only be corrected with software adjustments.

6. **What is ambient light?**

   Light from any source, other than the projection device, that reaches the screen surface. The amount of ambient light affects the contrast, and resolution of the screen.

7. **How do I receive software updates?**

   Datacolor is constantly working to improve and upgrade our software. These updates are then posted in the 'Software Upgrades' section of our website, where our customers can download them free of charge. The only thing the customer needs in order to successfully install their Datacolor update is their serial number.

8. **Where is my software serial number?**

Your serial number will be either 17 or 18 digits long; depending on your application. It is located on the inside of your box under the hardware device. Please do not confuse this with the hardware serial number for your hardware device(s).

9. **Why don't my monitors look the same after calibration?**

Visual observation of two monitors sitting side-by-side will never appear to match. Even if they are the same type, make and model, two displays will have subtle differences that are readily discerned in side-by-side comparison, but become negligible when each display is viewed separately.

Comparing a CRT monitor to an LCD monitor will be even less rewarding because of the inherent differences in display technology. In a side-by-side comparison between a CRT and an LCD, the LCD will always be perceived as 'brighter' and having 'higher contrast'. This is because the peak luminance of an LCD is typically about twice that of a CRT, even when you calibrate both monitors to have the same Gamma and White Point.

To compound the effect, the organic eye-brain colorimeter (aka human color perception) causes one kind of difference to be perceived as if it were another kind of difference. Even if two samples have the same color but different luminance, they will be perceived as also different in color. Thus, when you calibrate a CRT and an LCD to the same Gamma and White Point and place the monitors next to each other, the fact that the LCD is twice as bright will cause them to appear different in color even if an instrument records identical chromaticities.

The human visual system has another powerful feature, referred to as 'adaptation'. For example, if you move from a room with incandescent lighting to one that is lit with fluorescent tubes, you will initially perceive white objects as having a bluish cast, and possibly brighter than they were. However, after a few minutes, your visual system 'adapts' to the new environment and your 'adapted' perception is that white objects are merely white.

Visual adaptation allows us to use two different technologies, like CRT and LCD, to view the same image file with similar perception. However, if you place two different monitors side-by-side and view them simultaneously, the visual system cannot adapt to both simultaneously. They will always appear different (in color, luminance and contrast) due to that very sensitive 'comparison' function of human visual perception.

Therefore, a side-by-side comparison of two monitors is not a reasonable metric for determining whether you can use each monitor individually and achieve similar results. A better test would be to put each monitor in a separate room, displaying the same image file (using the same software). Then view the image on monitor 1, allowing time for visual adaptation. Next, move to monitor 2, again allowing time for visual adaptation.

In such a test it is important to confirm that the image file being viewed has an embedded ICC profile that accurately defines its color space. Also that Photoshop's Color Settings are set such that the embedded color profile is used, and that each monitor is correctly calibrated, profiled and its profile is set as the current monitor profile.

10. **What is Datacolor's technical support policy?**

Datacolor provides technical support at no additional charge. If you have a question, please visit our support site:
support.datacolor.com