



Color Matching –
Beginning with
the Basics

EIZO's Guide to \ a further / enjoyment of digital photography



As the use of digital cameras spreads, there are many more ways to enjoy digital photos!



Print them out at home and make a photo book



Post them on a photo sharing site or on your blog



View them in a digital photo frame or on a TV

But if you don't use a monitor suited for displaying digital photos...



The colors of photos you took so much trouble to retouch will not be viewed by others as you intended.



You're unable to print photos in the colors you want, and have to try again and again, thereby wasting time.

It's actually important.

Which monitor you use to display digital photos



To enjoy digital photography \more/...



It's important to use a monitor that is suited for displaying digital photographs.

- Achieve the colors you want in photos
- Finely retouch photos in the correct colors
- Make the colors displayed on the monitor match those in the printed photo

When printing digital photos at home...



EIZO's recommendations for enhancing your enjoyment of digital photography

Monitors

For color matching between on-screen and printed photos



23" ColorEdge CS230

Color gamut: Equivalent to sRGB
Smooth gradation: Excellent
Uniformity: Excellent
Easy display adjustment: Excellent



ColorNavigator Elements

Photo color matching software

For use only with the ColorEdge CS and CX series
Allows comfortable intuitive operation, supporting color matching even for beginners.

NOTE: The ColorNavigator Elements software can be downloaded from the EIZO web site at no charge.
<http://www.eizo.com/global/products/coloredge/cne/index.html>



24.1" ColorEdge CX240

Color gamut: Covers most of Adobe® RGB
Smooth gradation: Excellent
Uniformity: Excellent
Easy display adjustment: Excellent

If you can print photos that match the image you see, digital photography will be **more enjoyable!**



Photo displayed on screen



Photo printed out on an inkjet printer

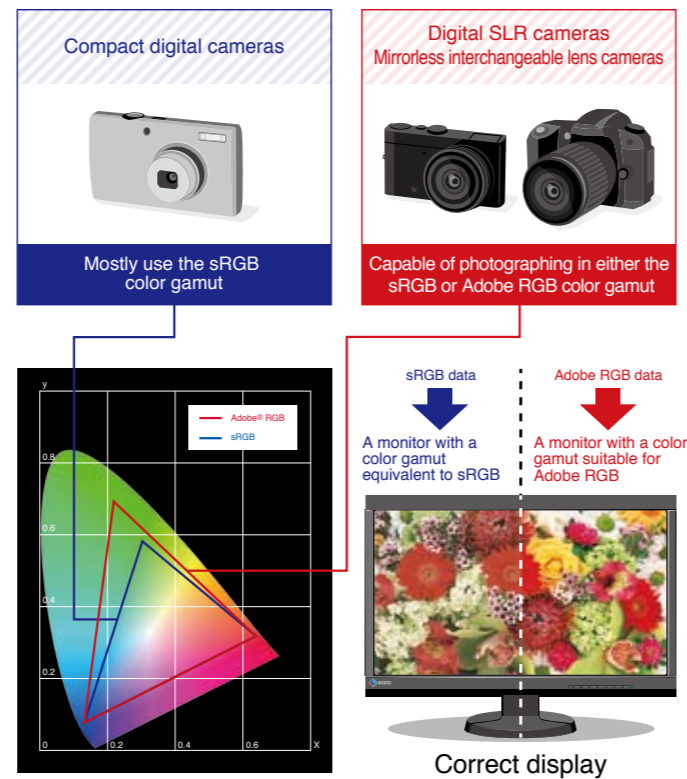
Color matching between on-screen photos and inkjet printouts reduces wasteful reprinting costs, saves the time and labor that repeated retouching takes, and leads to higher quality printed images.

What does a monitor need to display correct digital photo images?

1 Able to display the correct color gamut

There are two types of digital cameras in terms of color space: those with which you shoot using the sRGB color space; and those with which you can choose to shoot using the sRGB color space or the even broader Adobe® RGB color space. With Adobe RGB, you can shoot emerald-green oceans and brilliant yellow flowers, but if you are using a monitor with a color gamut not suited to Adobe RGB, the images will not be displayed correctly. On the other hand, while the reproducible color space for sRGB is narrower, color management is easier because it is meant for general use.

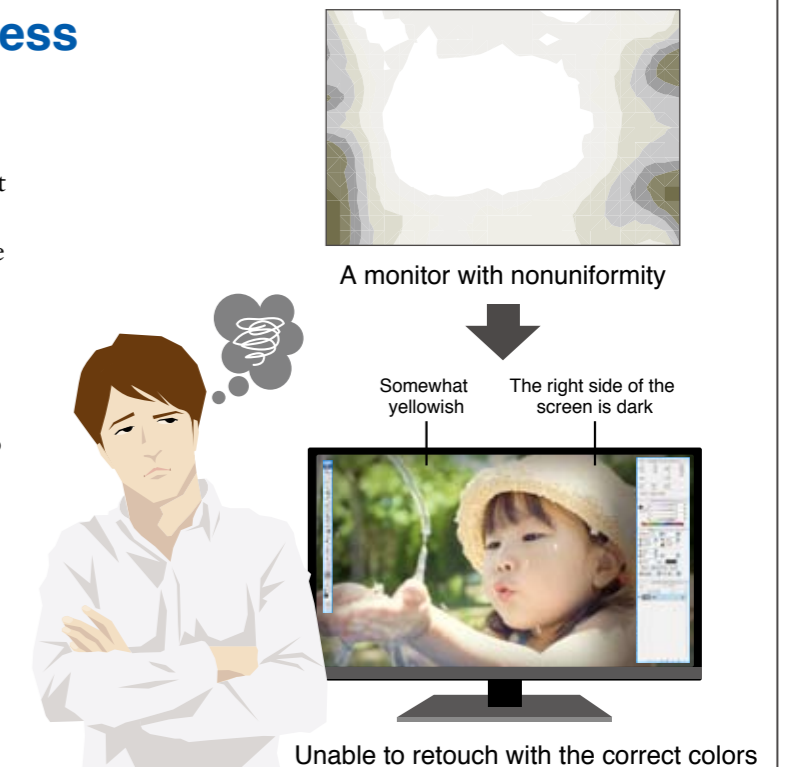
It is necessary to select a monitor depending on your color management method – Adobe RGB or sRGB.



3 No unevenness in brightness or color on screen

There are many recorded pixels in photo data, and because they do not all fit in window displays, most retouching takes place on a full screen. Monitors with poor accuracy to start with or monitors whose color display has changed after long periods of use may have dark patches or color infusion in sections, leading to nonuniformity.

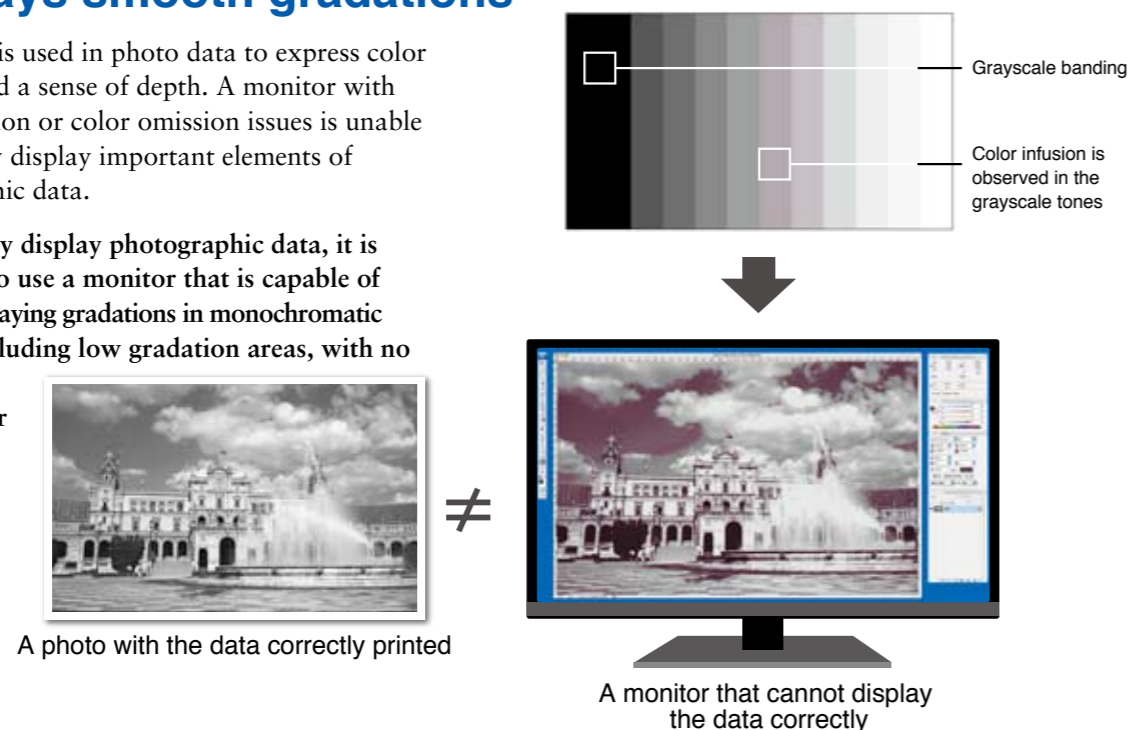
For displaying digital photos, the most suitable monitor is one that has been adjusted in advance to correct uniformity errors. You are even better off with a monitor with circuitry that takes into account changes in the monitor's displayed brightness, etc. due to continued use, and adjusts for them.



2 Displays smooth gradations

Gradation is used in photo data to express color shading and a sense of depth. A monitor with color infusion or color omission issues is unable to correctly display important elements of photographic data.

To correctly display photographic data, it is necessary to use a monitor that is capable of clearly displaying gradations in monochromatic images, including low gradation areas, with no color infusions or omissions.



4 Easy-to-adjust display

One requirement is a display that can be finely adjusted for brightness and color tone with minimum effort. Most monitors are adjusted using buttons on the front of the monitor or software produced by other companies. However, because there are limits to the adjustments that can be performed, and it takes time and expertise to perform them, these monitors are not the most suitable for digital photo displays.

The ideal is to use software and sensors dedicated to the monitor you are using, in order to easily adjust color display correctly in a shorter time depending on the way you like to enjoy digital photos. In addition, you will find it easier to maintain the correct color display if you select timesaving items to make regular readjustments.



Adjust the monitor screen to match the printed photos! Easy color matching using ColorNavigator Elements

OS: Windows 7
Retouching software: Adobe® Photoshop Elements 11

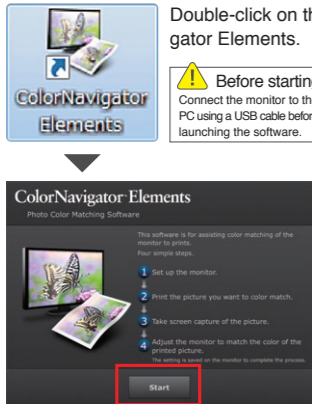
EIZO offers free photo color matching software dedicated to the ColorEdge CX and CS series LCD monitors, which we recommend for digital photographers.

Easy to use with only 4 steps! Let's take a look at the adjustment procedure.

1 Basic monitor settings

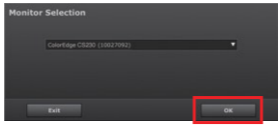
Double-click on the icon to start ColorNavigator Elements.

Before starting
Connect the monitor to the PC using a USB cable before launching the software.

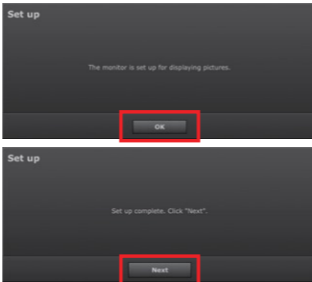


When the ColorNavigator Elements menu is displayed, read the explanation to be sure of the procedure, and click on the **Start** button.

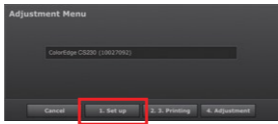
In the Monitor Selection dialog box, check that the name of the monitor you are going to adjust is selected, and click on the **OK** button.



By simply following the instructions on the screen and clicking on the **OK** and **Next** buttons, the monitor will be automatically adjusted to the suitable settings for displaying photos.



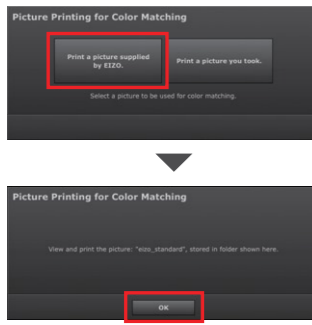
When the menu appears, click on **1. Set up**.



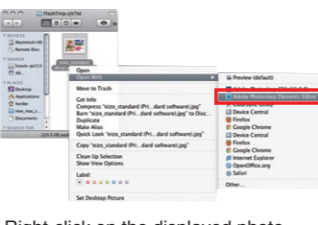
2 Print the reference photo for color matching

The next step is printing a reference photo to be used for color matching. You can use the matching sample recommended by EIZO or your favorite photo from their stock. Here, we will use EIZO's matching sample, so click on **"Print a picture supplied by EIZO"**.

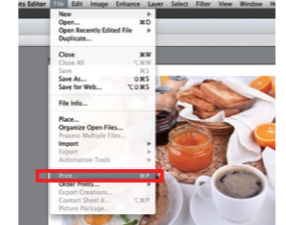
Follow the instructions and click **OK**.



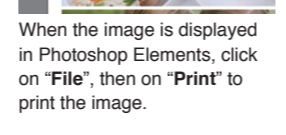
For the retouching software settings, refer to pages 9 and 10.



Right-click on the displayed photo data, click on **"Open With..."**, and select the name of the retouching software that you will use. Here, select **"Photoshop Elements"**.




When the image is displayed in Photoshop Elements, click on **"File"**, then on **"Print"** to print the image.



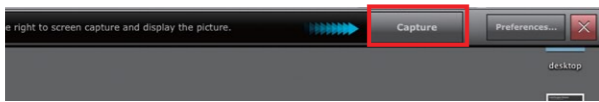
3 Capture the displayed photo

When printing is finished, return to ColorNavigator Elements, while keeping the photo displayed in Photoshop Elements as is.

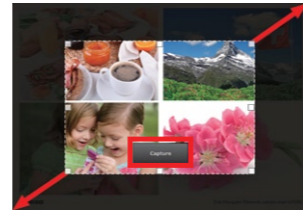
If Photoshop Elements is displayed full screen, click on the ColorNavigator Elements symbol on the task bar (Windows) or the dock (Mac OS) to return.



Click on the **Capture** button at the top of the window.



Drag the corners of the displayed frame to enlarge it so that it exactly covers the area of the image displayed in Photoshop Elements. After doing this, click on **Capture**.



4 Adjust the screen to match the printed photo

The imported photo is displayed in ColorNavigator Elements. Now, adjust the monitor screen to match the printed photo while viewing it.




- Match the Luminance.**
Move the slider right or left.
- Match the color.**
Select the thumbnail that is closest to the printed photo from the 25 samples. The clicked thumbnail is enlarged and displayed to the left. The amount of adjustment can be changed using the slider on the side.
- When color matching is finished, click on the **"Complete adjustment"** button at the top left.

After step 2, perform as needed...



Under the **"Feature colors"** tab, you can separately adjust **skin tone and sky tone**, which are particularly difficult to match visually.

The adjustment result is stored in the built-in correction sensor – it just takes a few seconds after clicking on **OK**.



Click on **Exit** to finish the monitor adjustment. After this adjustment, the built-in correction sensor automatically corrects the adjustment at intervals of 200 hours to maintain the display setting.



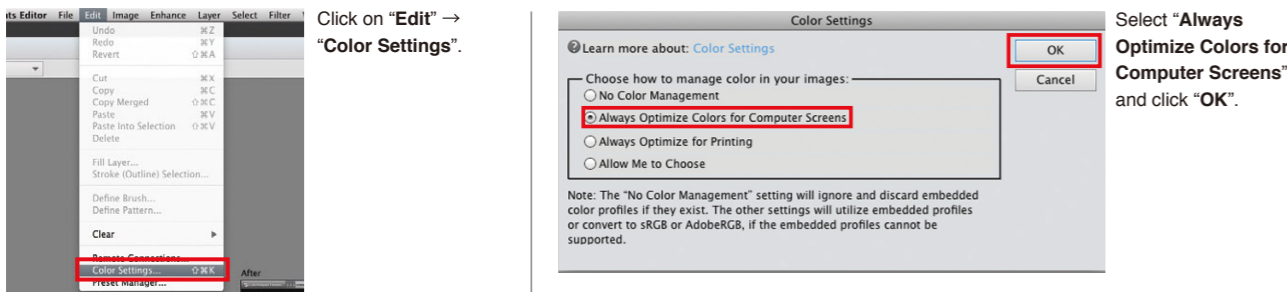
Excessive adjustment, which can influence other colors, should be avoided.

Retouch software settings

In order to match monitor colors with printed ones, it is also important to appropriately select the color settings for the retouch software that is used to display photos. The following is an introduction to the recommended settings for color matching using three typical software packages.

Adobe® Photoshop Elements 11

The default settings are used here.



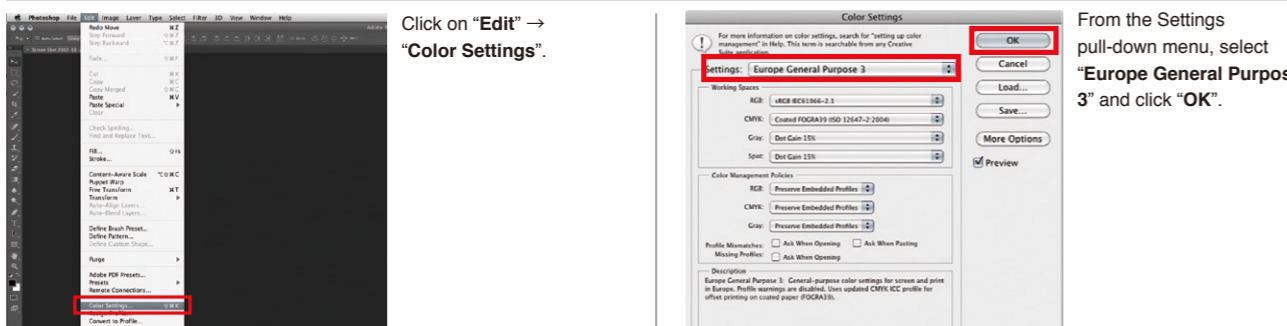
Click on "Edit" → "Color Settings".

Select "Always Optimize Colors for Computer Screens", and click "OK".

Note: The "No Color Management" setting will ignore and discard embedded color profiles if they exist. The other settings will utilize embedded profiles or convert to sRGB or AdobeRGB, if the embedded profiles cannot be supported.

Adobe® Photoshop CS6

The default settings are used here.



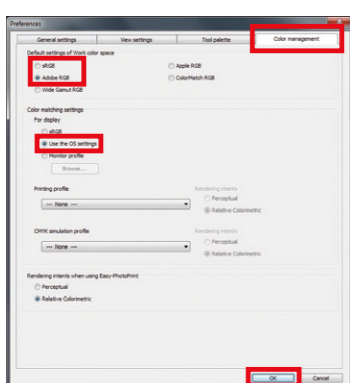
Click on "Edit" → "Color Settings".

From the Settings pull-down menu, select "Europe General Purpose 3" and click "OK".

Canon Digital Photo Professional

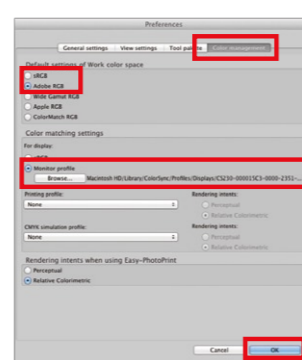
Canon Digital Photo Professional requires manual setup.

For Windows



From the "Tool" pull-down menu, select "Preferences", and then the "Color management" tab. In "Default settings of Work color space" select "sRGB" or "Adobe® RGB", depending on your color management method. In "Color matching settings", "For display" select "Use the OS settings". Click "OK".

For Mac OS

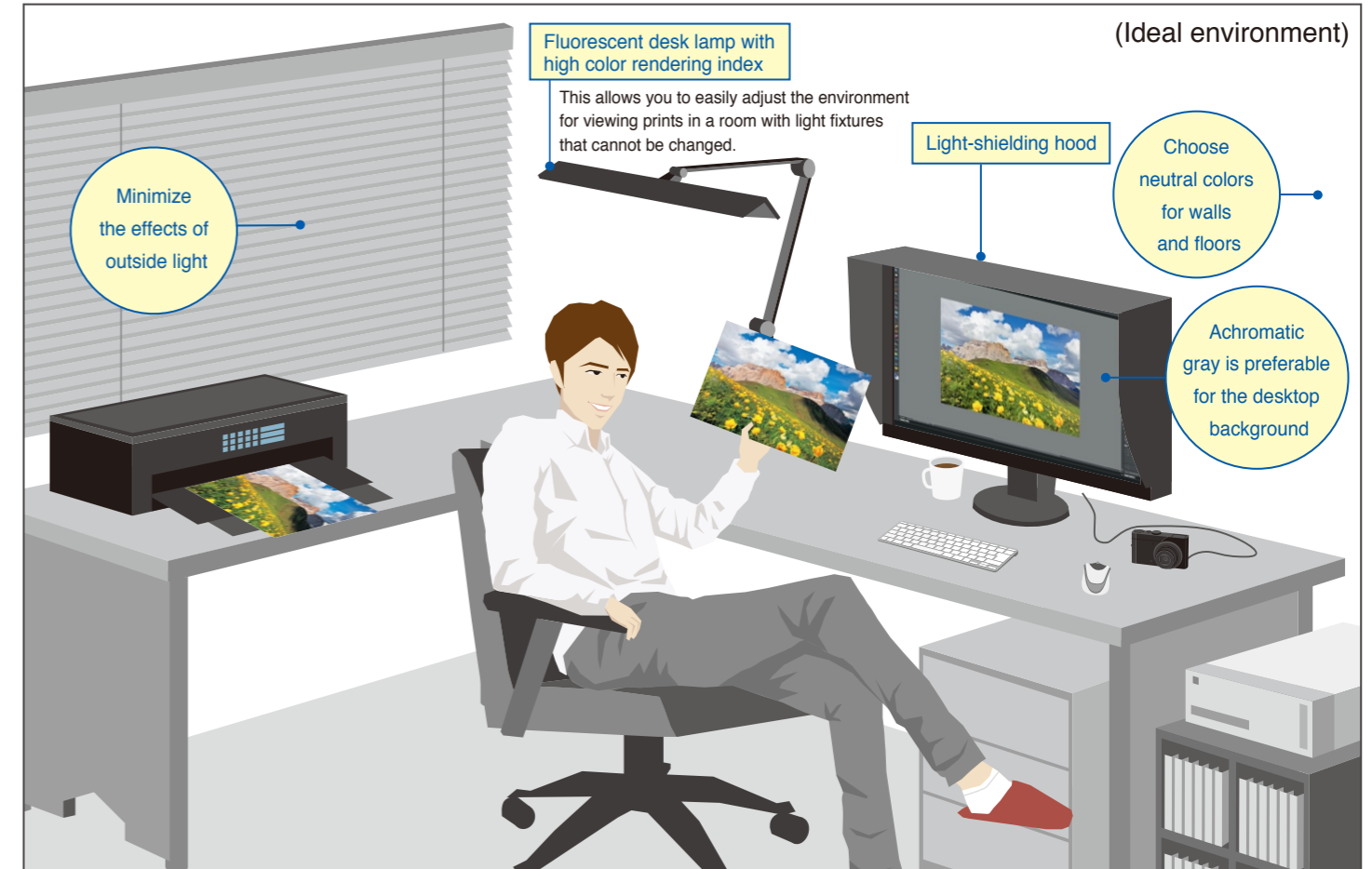


From the "Digital Photo Professional" pull-down menu, select "Preferences", and then the "Color management" tab. In "Default settings of Work color space", select "sRGB" or "Adobe® RGB", depending on your color management method. Under "CMS settings for print" and "For display", select "Monitor profile". Click on the "Browse..." button and set the profile of the created adjustment target. Click "OK".

* The profile name of the adjustment target created using ColorNavigator Elements will be "Monitor name(Serial No.)_CNElements.icc". (E.g. CS230(10000001)_CNElements.icc)

Environment preparation

Even if color matching has been successfully performed between on-screen and printed photos under indoor lighting conditions in the evening, they may look different under outside light during the daytime. To correctly check the color, it is necessary to adjust the lighting conditions and to control environmental light so that images are always evaluated under the same conditions.



EIZO's recommendations for enhancing your digital photography experience

Accessories



EIZO accessory
Monitor hood
CH7 For CX240
CH6 For CS230
EIZO's original monitor hood effectively blocks outside light and reflections from the screen.

Good to Know

Fluorescent light tubes with a high color rendering index and a color temperature of 5000 K are recommended for room lighting.

It is necessary to adjust the environmental light to 5000 K, the standard color temperature for printing, in order to establish a color matching environment.




Products with either of the following codes, which indicate light color and wave length, are applicable:

- N-EDL ... AAA Day white color rendering
- N-SDL ... AA Day white color rendering

Further mastery of digital photos

The information provided to this point outlines the basics for color matching between the monitor and photo prints. The following sections introduce information for those who would like to further master digital photos.

Photo prints are not the only way to enjoy digital photos. For advanced users who want to further master digital photos with EIZO, we have prepared a software program for ColorEdge in addition to ColorNavigator Elements.




ColorNavigator™

Color management software for ColorEdge

To further enjoy digital photos, you can perform more extensive and high precision adjustments. Use the calibration sensor to calibrate the monitor for the optimal displays for uploading photos to the Internet or editing digital photos. In addition, when printing photos, you can create the optimal adjustment targets for various printers and paper types, and switch between them with the press of a button.

What is a calibration sensor?


It is a device that measures the current monitor status in order to adjust it based on the monitor's intended use.




What is calibration?

Calibration is adjusting the monitor while referring to the values measured by the sensor in order to achieve the desired display results.

The ColorEdge professional CG series is equipped with a built-in sensor that performs calibration independently, so adjustments can be implemented on the monitor alone using ColorNavigator. On the other hand, the CX series and CS series cannot perform calibration on the monitor alone, so models equipped with the EX2 sensor for use with ColorNavigator are available, and allow you to perform calibration soon after purchase.



CG series
CG276
CG246

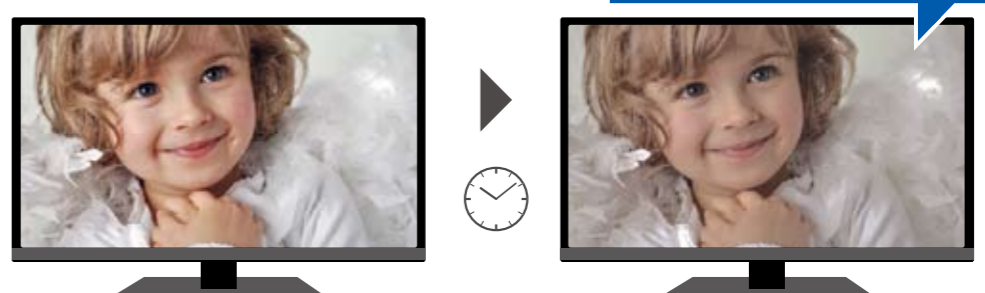


CX series, CS series
CX270
CX240
CS230

Regular calibration of the monitor

The monitor's display of color changes over time with use, so regular readjustments are very important. ColorEdge is equipped with a built-in sensor that automatically performs regular adjustments, constantly maintaining the same conditions and allowing you to enjoy your digital photos with peace of mind.


Monitor that cannot perform regular display corrections



Correct color display → **Change in display characteristics**


Becomes dark, changes color tones

ColorEdge



Correct color display → **Maintains display characteristics**

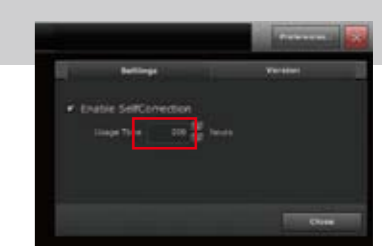
The reason...



Because the built-in sensor automatically re-calibrates the monitor at regular intervals to correct the display.

With ColorNavigator Elements...

After you adjust the monitor, the built-in correction sensor automatically re-adjusts the monitor at intervals of 200 hours. The re-adjustment timing can be customized in the "Preferences" tab.



Uses for digital photos
Enjoy printing
Requirements for monitors
Adjusting the monitor
Retouch software settings and environment preparation
Additional information on monitors

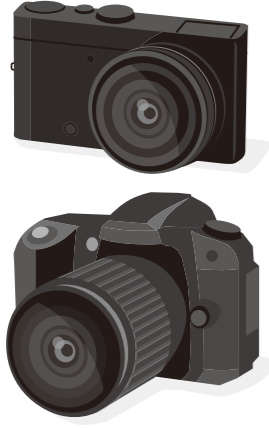
Choosing the right monitor

We have an extensive line-up of EIZO ColorEdge color management monitors to allow you that enjoy your digital photos. Here we recommend a model based on how you use your monitor.

When using a compact camera

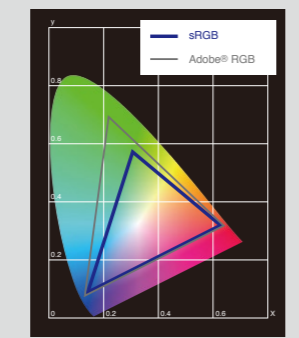


When using a mirrorless interchangeable lens camera or digital SLR camera



Decide on color management with sRGB

- Photograph in RAW and develop in sRGB
- Photograph in sRGB



With easy-to-handle sRGB!

YES

NO

Color matching beginner

NO

YES

NO

Sufficient for printing images up to A3 size!

YES

NO

ColorEdge CS230

Equipped with ColorNavigator Elements*

Optimum for color management with sRGB. A cost-performance model that allows you to use ColorNavigator Elements to perform easy color matching with intuitive operations.



ColorEdge CX240

Equipped with ColorNavigator Elements*

Perform color management with Adobe® RGB. Use ColorNavigator Elements for easy color matching with intuitive operations. This 24.1" model shows images at A3 size + tool palette display.



ColorEdge CX240

ColorNavigator and a calibration device (sold separately)

Further enrich your digital photo experiences while using Adobe RGB for color management. Quickly begin professional-level calibration with ColorNavigator. This 24.1" model shows images at A3 size + tool palette display.



ColorEdge CX270

ColorNavigator and a calibration device (sold separately)

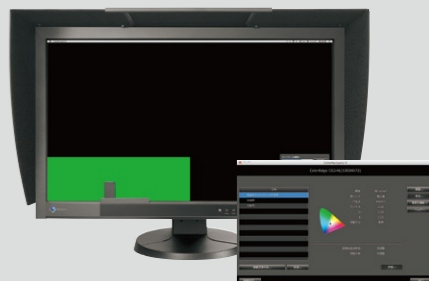
Further enrich your digital photo experiences while using Adobe RGB for color management. Perform professional-level calibration with ColorNavigator and retouch high resolution images of up to 2560x1440 on this 27" model.



If you want to further master digital photos...

ColorEdge CG Series

This professional series, with its built-in calibration sensor, is a favorite among photography pros.



*Scheduled for inclusion from January 2013. Can be downloaded free from the EIZO web site.

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