display

User Manual

Inhalt

Chapter 1

Preface

1. Preface

With the purchase of this basICColor display monitor calibration and profiling software you have received a product that will allow you to take control of color reproduction in your workgroup monitors. Along with creating an ICC-profile, proper calibration of workgroup monitors is a basic and indispensable requirement for accurate color reproduction. Both CRT and LCD flat screen monitors can be profiled and calibrated with this software. Either manually, using the computers video card's Video LUT, or automatically via hard- ware calibration (only with supported displays).

To maximize your color management results with basICColor display it is important to calibrate and profile all the components involved in the production process, including scanners and printers. By implementing basICColor display into your workflow, you will be able to offer your clients a digitally color-calibrated network that can produce accurate off-press proofs in order to achieve the best possible printed and published results.

With basICColor display you have purchased an extremely powerful, yet user-friendly software that can resolve your company's color management challenges.

Chapter 2

Installation and Licensing

2. Installation and Licensing

2.1. Minimal Systemrequirements

Apple Computer

- Apple® with Intel Processors
- Mac OS X (10.5.6 or higher)
- min. of 1 GB available system memory (RAM)

Windows®

- Intel® Pentium 4-Prozessor
- Windows® XP SP2, Windows® 7, Windows® 8 (32- and 64-Bit)
- min. of 1 GB available system memory (RAM)

All Systems

- Min. 100 MB free hard disk space
- DVD-drive
- Color monitor with a resolution of least 1024 x 1024 pixels and color depth of 24-Bit (16,7 million colors)

Knowledge requirements:
These instructions assume familiarity with the basic operation of the Mac OS X and/or Windows operating systems.

Documentation:
This document describes the application of basICColor display for both Mac OS X and Windows. Any differences in operation or special instructions that apply to either system will be indicated.

Before beginning the installation process, please make sure that your measurement device is not connected to the computer. Connect it after the software has been successfully installed.

2.2. Installation

1) Turn on the computer on which you wish to install and use the software.

2) Insert the basICColor CD-ROM into your drive.
Alternatively you can download the installer from www.basICColor.de.

   - **Mac:** The basICColor CD-ROM folder will appear on your screen. Click on it to access the basICColor *display Installer* or open the downloaded installer. We recommend a look at our download area as this ensures you have the latest version.

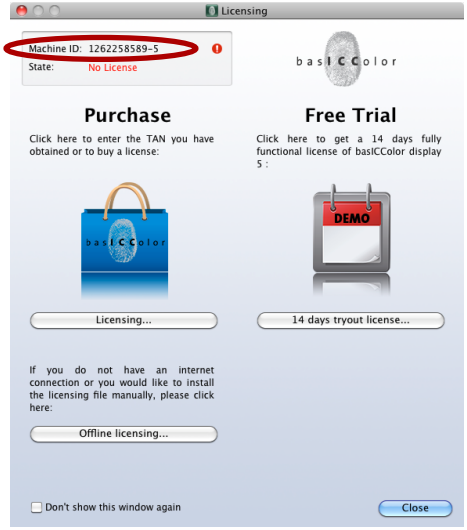
   - **Windows:** If the basICColor *display* CD-ROM does not appear automatically go to "My Computer" and select the CD-ROM drive.

3) Begin installation by double-clicking the basICColor *display Installer*. Follow the instructions on the screen.

4) Once basICColor *display* has been successfully installed, you can begin to profile your printer.

Note: 14-day Tryout License

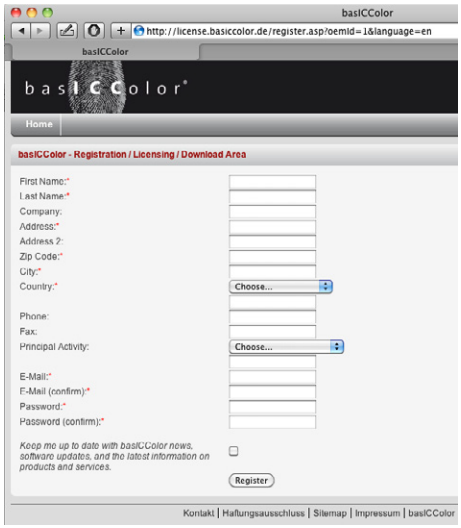
basICColor GmbH offers a full trial version of *basICColor display*.
The software is fully functional and has no restrictions.
The 14-day Tryout License license is available from the *basICColor* license server (http://mylicense.biz/basiccolor).



2.3. Product registration and licensing

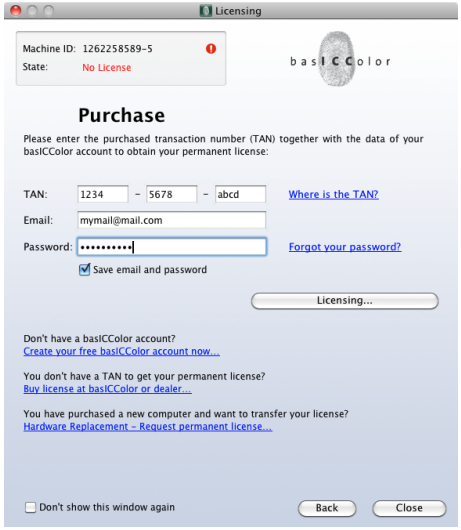
Licensing and unlocking *basICColor display* software is linked to an individual computer. You will receive an individual license that allows you to "unlock" and use the software on the computer on which it was installed.
The first time you start *basICColor display*, the "Licensing" window will pop up.

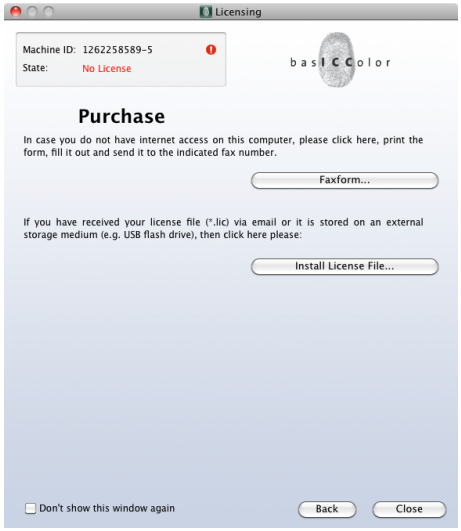
You can now choose to trial a full version of *basICColor display* for **14 days** or request your **permanent** license if you have purchased a license for *basICColor display.* Therefore please click the <Licensing...> button.



If you have never registered on the *basICColor* website you will need to complete the registration process in order to obtain your personal *basICColor* account. With a "click" on <Register> you can create your personal *basICColor* account. Within seconds you will receive an email to your nominated email address. (Please – also check your spam folder) You need to confirm this email via the provided link to activate your account.

Important: Without confirming this link your *basICColor* account won't be activated!





If you are already registered on the *basICColor* website you can directly unlock your software from the licensing window. Enter your **email** address and your **password** and then either unlock a 14 day full trial version or your purchased permanent license.

If your computer is not connected to the internet please log yourself onto the *basICColor* licensing website (***http://mylicense.biz/basiccolor***) on a computer that is connected to the internet. Once you are logged in you can request a 14 day full trial version OR – in case you have a TAN – you can request your permanent license. Once downloaded please transfer the license file on the computer where *basICColor display* is intalled. With a "click" on <Offline licensing...> and <Install License File...> in the next window you will activate *basICColor display*.

If you do not have an Internet connection at all, use the <Faxform...> button to open a PDF document. Fill it in and fax it to the number provided. The license file will be sent to the nominated email address.
If required a storage device can be obtained at additional cost. Please contact *basICColor GmbH* for further information.

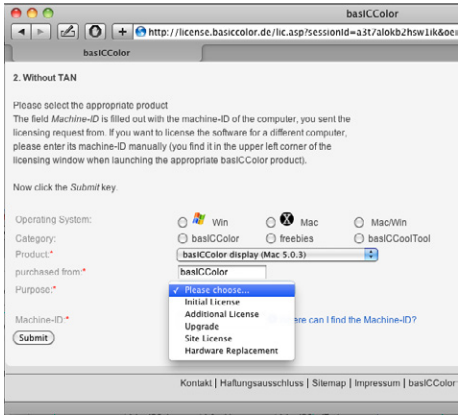
On the inside of the DVD-ROM box you will find the TAN-Number.

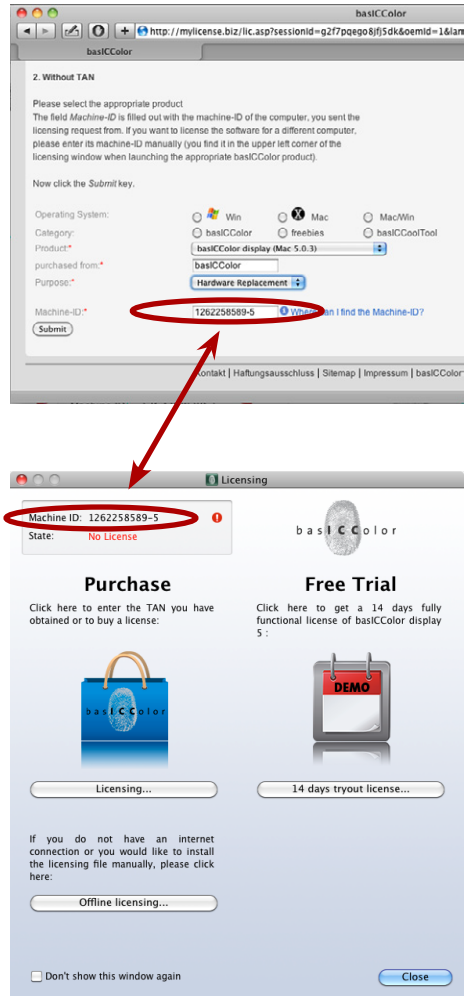
When you request a license you need to consider the following:

- **TAN...** **T**rans**A**ction**N**umber. You will find the TAN on a sticker on the *basICColor* DVD cover. Enter the TAN into the input field. Your license file (.lic file) will be downloaded and installed immediately.

  If there is no TAN on your *basICColor* DVD cover your license request needs to be processed by *basICColor* before you can access your license file (.lic file). Please log into your *basICColor* account and go to "2. Without TAN". Choose "*basICColor display*" as product. Fill in the other input fields (purchased from, Machine-ID) and choose the the purpose for the license request: Initial License, Additional License, Upgrade, Site License, Hardware Replacement.

  Once all input fields are filled "click" on the <Submit> button. You will be informed that your license request will be processed and that you will be notified when you can access your license file.





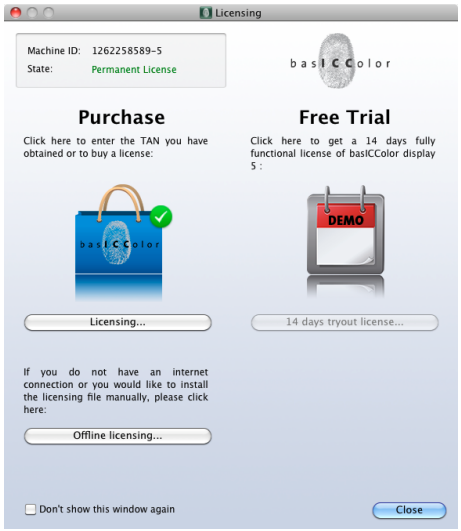
- **Machine ID...** the number in this input field **must** match the number in the licensing window of the application because the license file (.lic file) was built for this computer specifically.

- **Produkt...** *basICColor display* must be selected in the pull down menu.

Important: the license file (.lic file) is stored in your *basICColor* account. You can access it at any time. Please ensure to remember your login information.

Once you have received your license file **(basICColor_display5_123456.lic)** you can install it with <Offline licensing...> and <Install License File...>. You will find the license file in the download folder of your web-browser. Now the application is ready to use!

Now that you've got your personal license file **(basICColor_display5_123456.lic)** you won't need a new license file for software updates or a new installation of *basICColor display* as long as it's done on the same computer. If you want to install *basICColor display* on another computer you need to request a new license file **(basICColor_display5_123456.lic)** for



that computer. You can purchase additional licenses from your *basICColor* dealer or *basICColor GmbH* directly at any time.

Hardware Replacement:

If you have bought a new computer and wish to transfer *basICColor display* please follow these steps:

1.) Install your software on your new computer
2.) Start the application and click the <Licensing...> button in the Licensing window. Then click the link: "Hardware Replacement - Request permanent license..."
3.) Please log now into your *basICColor* account and go to "Licensing" and the to the section "2. Without TAN".

You can check the status of your license in the licensing window of *basICColor display*. Via the menu item "Help ¬ License..." you can open the licensing window and you will see in the upper left corner the current "Status" of your license . In our example, the software is permanently licensed.

Chapter 3

Quick Start

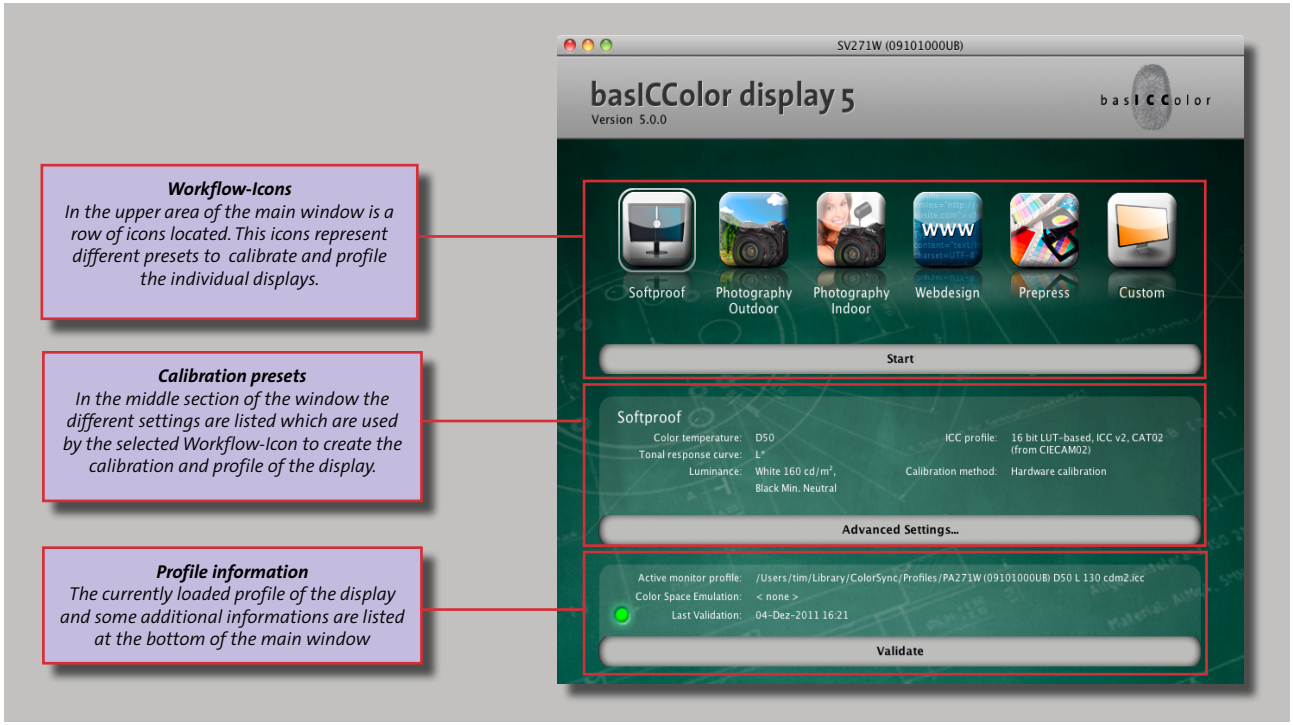
3. Quickstart

3.1 The main window

When basICColor display starts up a main windows will pop up on all monitor connected to the computer. Every single display can be calibrated individually through this main window.

All important information about the monitor and the calibration settings are located in this main window.

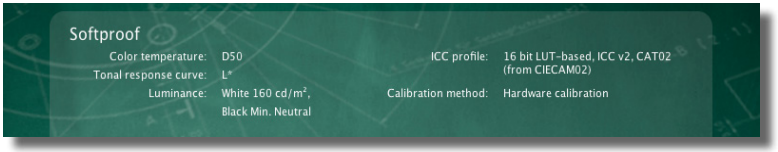
This makes basICColor display very comfortable to use



3.2 Selection of the calibration preset

In the top area of the main menu is a row of Icons which represent different kind of workflow to those the display the display should be calibrated. With a click on an icon it will be surrounded by a line and basICColor display is prepared to calibrate the display for this kind of workflow.

Which detailed calibration settings (detailed information about the setting can be found in chapter 4 - Advanced settings) are represented by the workflow-icon are displayed in the middle section of the main window of basICColor display.



At the bottom area of the main window of basICColor display the current active display profile is shown. Additional information about a color space emulation and when the display was validated for the last time can be found there too.

3.3 Preparation of the monitor calibration

Before you start the calibration and profile creation for your display you should take a look at your display and process the following checks.

3.3.1 Cleanliness of the screen

Please check if the screen is clean, free of dust, fingerprints etc. basICColor recommends to clean the monitor each time before profiling.

3.3.2 Reflections / Stray Light

Turn the monitor off and check if you can see any reflections of light sources on the screen. If so, you need to change the monitor position and/or to shield the monitor with an ambient light hood.

3.3.3 Ambient Light

The ambient light in your working environment should comply with the relevant standards. For measuring the ambient light, please refer to chapter *4.10.2 Ambient light*.

3.3.4 Monitor Warm Up

The colors of a monitor are becoming stable after a certain time. For this reason please turn on the monitor at least 30 to 60 minutes before measuring. This allows the monitor to stabilize the color output.

3.3.5 Driver for the graphic card

Please check if your graphics card uses the latest driver. basICColor display requires a driver which allows to write a video-LUT into the graphics card. Otherwise an error message will pop up in basICColor display during the profiling process.

3.3.6 Screen Saver / Power Saving Mode

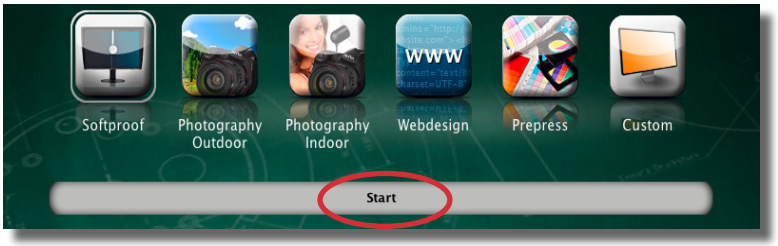
During the warm up, calibration and profiling of your monitors, please deactivate all screen savers and the power management of your operating system.
Otherwise incorrect measurements can occur during the calibration and profiling process.

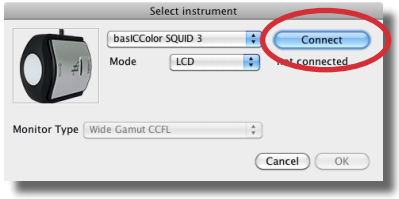
3.3.7 Position of the measurement device

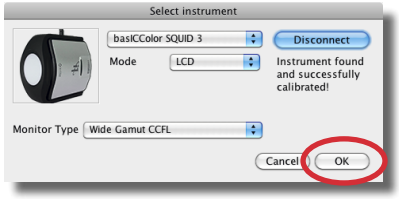
Please check if the measurement device is positioned flat on the screen surface. Otherwise ambient light can enter the sensor, resulting in false measurements.

3.4 Starting the profile creation

After the selection of a calibration preset the calibration and profiling process can be started by a click on the <Start>-button. The <Start>-button is located under the row of workflow-icons.







Tip: Measurement instrument

basICColor recommends to connect the measurement instrument to the computer before starting basICColor display.
Some instruments can only be identified by basICColor display when they are already connected to the computer.
For some instrument this is required because otherwise the system driver for the instrument will not be loaded by the operating system and basICColor display will output an error message.

3.5 Selecting a measurement instrument

The next step is to select a measurement instrument in the pop-up window which shows up after the profile creation process was started.

At the first start of basICColor display there is no measurement instrument selected. Besides selecting the instrument there are some additional options which have to be selected for the operating mode of the instrument.

Different measurement devices have different option which can be selected. For detailed information about the different instrument setting take a look chapter 4.1 select instrument.

At first the operation **<Mode>** of the measurement instrument has to be selected. Then the instrument can be connected to basICColor display with a clock on the <Connect>-button. Follow the instructions to calibrate the instrument (if necessary). At last the <Monitor type> has to be selected (if available).

When all selections are done the window can be closed with a click on **<Ok>**.

At every next start basICColor shows the last selected/ connected measurement instrument as preselection.

3.6 The profile creation process

After the connection of the measurement instrument with basICColor display a measurement window pops up.
The window should be located to the middle of the display and the measurement instrument has to be positioned to the middle of the measurement window.
If a beamer or a distance calibration of the display should be processed it's possible to enlarge the measurement window to full screen checking the **<fullscreen>**-checkbox.
The calibration and profiling process can be started by a click on the **<Measure>**-button.

The following measurement sequence can be separated into four single parts.

3.6.1 Measuring Color Characteristic...

The first step of the calibration is to gather the actual color properties of the monitor. This is required to determine the parameters for calibration and profiling.

3.6.2 Setting the White Point...

This step sets the color temperature in the monitor hardware or via video-LUTs in the graphics card.

3.6.3 Iterating gray balance...

basICColor display fine tunes the tonal response curve to the selected tonal response curve (L*, Gamma or sRGB) and optimizes the gray balance in an iterative process.

3.6.4 Measuring for profiling...

After calibrating the monitor basICColor display measures the color characteristic of the monitor again to create the ICC-profile

3.6.5 Results

After all the measurements have been processed basIC-Color display will show you the results of the calibration and profiling process. The measurement window will close automatically, the ICC-profile will be saved to the defined folder and the new ICC-profile will be activated. So you don't have to select and activate the profile manually.
In the main window you can see a summary of the results of calibration and profiling and the location, where the ICC-profile has been saved.

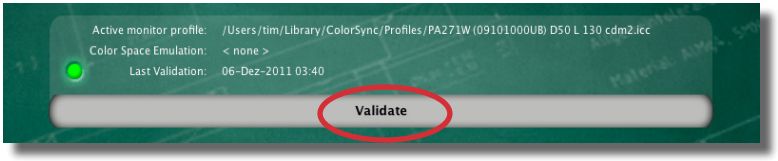
At this point the calibration and profiling of your display is finished and you can close basICColor display or continue with validating the calibration.

3.7 Validation

After the calibration and profiling process basICColor display is processing a detailed check.
This check is a simple integrity test of the calibration and the created profile.
This test was not designed to check if a display is able to be a softproofing display. It doesn't checks if a specific gamut was achieved by the calibration.
The basic function of this validation is to check the integrity of the profile. It just checks if the display achieves the same values as to the time the display calibration was processed.
This validation should be used as indicator if the calibration and the profile is still valid or a if a new calibration/profile has to be created.

This validation should be used periodically to check if the display of the monitor has changed over the time.

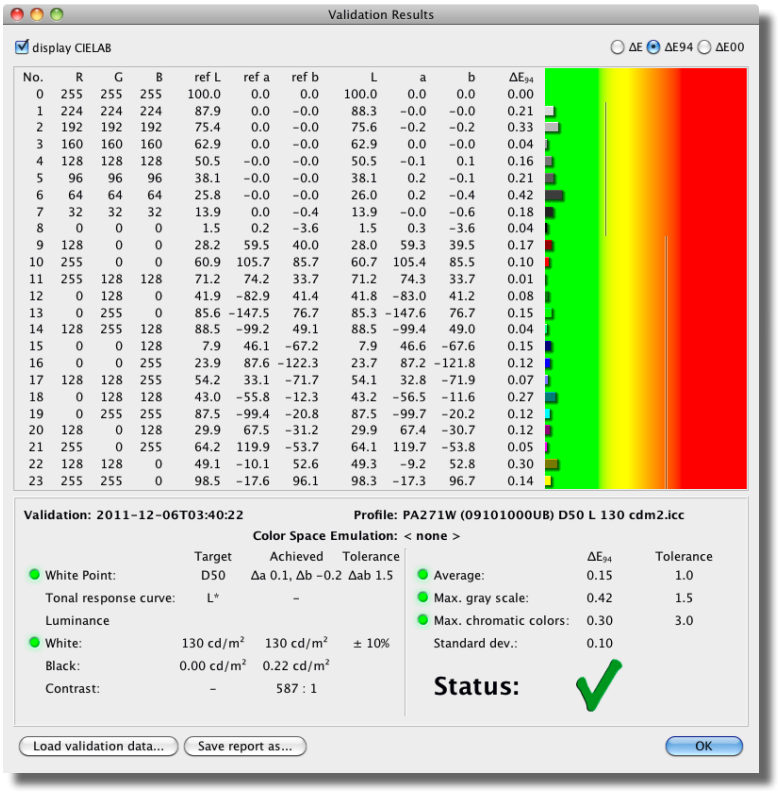
The validation of the current calibration and the current profile of the display can be started by a click on <Validate>. Then the already known measurement window will pop up again.



Every calibration should be checked once a while (e.g. once a week) to check if the display calibration and the profile are achieving the parameters which where achieved at the original calibration time.

To validate the display place the measurement instrument in the middle of the measurement window and start the validation process with a click on <measure>.

Then a series of color patches will be measured and the results are compared to the measurements which where done at the time the profile was created.



Besides the target values and the achieved values basIC-Color display will show a tolerance value.

3.7.1 Target values

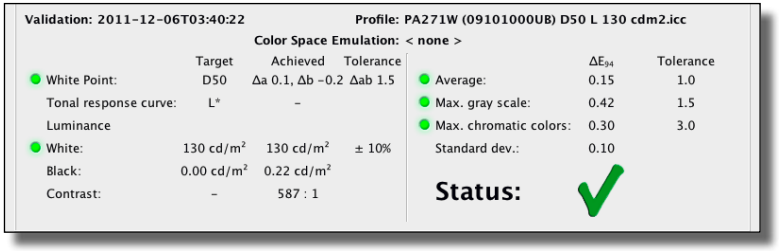
The target values are the original measurement values which where taken to create the calibration and profile.

3.7.1 Achieved values

These values are the current readings of the same colors.

3.7.3 Tolerances

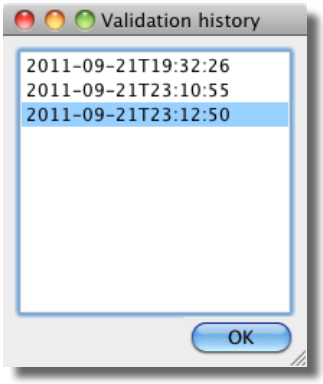
Quite often it is hard for users to sort in the pure DeltaE results and to decide if the validation result is ok or if the display has the be calibrated and profiled again.
For this reason there are some practicular tolerances are preselected to help the user to determine the threshold where to decide if a new calibration has to be done or not.
In the lower right area of the validation window represends a sinple icon if the validation has passed all criteria or not.
When all criteria are passed a green hook (✓) will be shown.



But if one or more criteria did not passed the validation the basICColor display will output a red cross (✗) instead.
The validation criteria can be seen more like a recommendation than a strict order to create a new profile. Every user has to decide by himself if a new calibration has to be done or not.

3.7.4 Display CIEAB

This check box lets you switch between Lab and XYZ values, it is checked by default.



3.7.5 Load validation result...

For every created validation basICColor display will save the measurements in the background.
To load a saved validation report click on <Load validation result...> and select a validation from the list. The validation results are saved by the date and time they have been created.

3.7.6 Save report as...

Another useful option of basICColor display is to save the currently shown validation result as a PNG-image file.

Chapter 4

Advanced Settings

4. Advanced settings

This part of the manual contains additional informations and explanations related to the settings and functions of *basICColor display.*

4.1 Selcet instrument

If the measurement instrument was not identified automatically or if you want to change the instrument it is possible to select the instrument manually. By a click on the insturment icon in the top left in the advanced window of basICColor

Supported measurement instruments


basICColor DISCUS

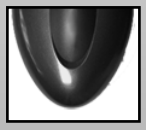

basICColor SQUID


basICColor SQUID2


basICColor SQUID3


Chroma 5


ColorMunki


DTP 94


Eizo Swing


EyeOne Display


EyeOne Display 2


EyeOne Display LT

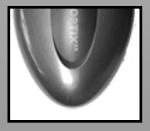

EyeOne Display pro

EyeOne Monitor

EyeOne pro


Konica Minolta CA-210

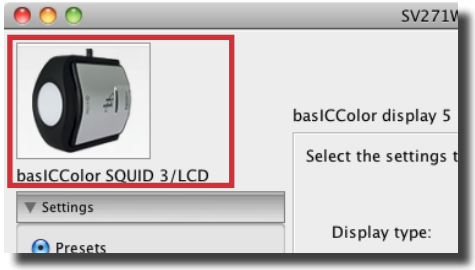

Konica Minolta KM-FD7/5


OPTIX XR

Sequel Chroma 4 USB


Datacolor Spyder2


Datacolor Spyder 3



display or by selecting *"File -> Select Measurement Device..."* in the main menu of basICColor display the measurement device selection window will pop up.
Select the instrument of your choice in the selection list and connect the instrument with a click on **<connect>** and follow the given instructions.

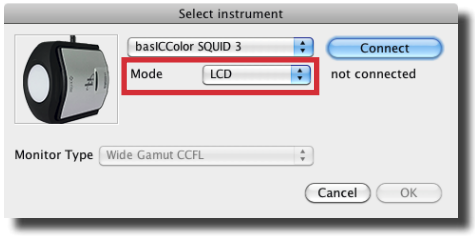
4.1.1 Mode

LCD-Flachbildschirm

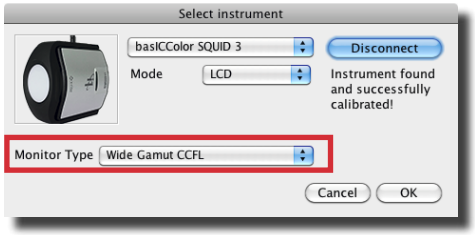
CRT-Röhrenbildschirm

LCD- and CRT-Displays need different adjustments of the instrument to be calibrated. Some instruments are offering a preselection of the mode the instrument should run in. Depending of the kind of display you would like to profile it's possible to select between "LCD-monitor" or "CRT-monitor". Some other instruments are offering the mode "spectrum" which can be used to calibrate CRT- and LCD-displays.

4.1.2 Monitor Type



Some modern colorimeters like the basICColor DISCUS or the basICColor SQUID3 offering a quite more optimized adjustment of the instrument to the used monitor. It's possible to select a specific type of display or even a specific monitor model. Please contact the manufacturer of your monitor to get information about the used technology of your monitor.



Also please consult the documentation of your measurement instrument to select the right setting for your type of monitor.
This selection is quite important of the way how your measurement device is measuring the charatecristics of your monitor. If a preselection of the monitor type is done which doesn't fit the characteristics of your monitor it's possible to get a not optimized calibration.
Please click on **<connect>** to connect basICColor display and the measurement device with each other.

When the instrument was connected with basICColor display and the calibration was done you can leave the dialog by a click on the **<OK>**-button.

basICColor display is supporting the following measurement devices:

Colorimeter:

- basICColor DISCUS
- basICColor SQUID
- basICColor SQUID 2
- basICColor SQUID 2 WG
- basICColor SQUID 3
- basICColor RAY (please select X-Rite DTP 94 USB)
- datacolor Spyder 2
- datacolor Spyder 3
- EIZO Swing
- Monaco OPTIX XR
- NEC MDSV Sensor (please select basICColor SQUID2/SQUID2wg)
- X-Rite DTP 94 USB
- X-Rite Eye-One display
- X-Rite Eye-One display 2
- X-Rite Eye-One display 2 WG
- X-Rite Eye-One display LT
- X-Rite i1Display Pro

Spectrophotometer:

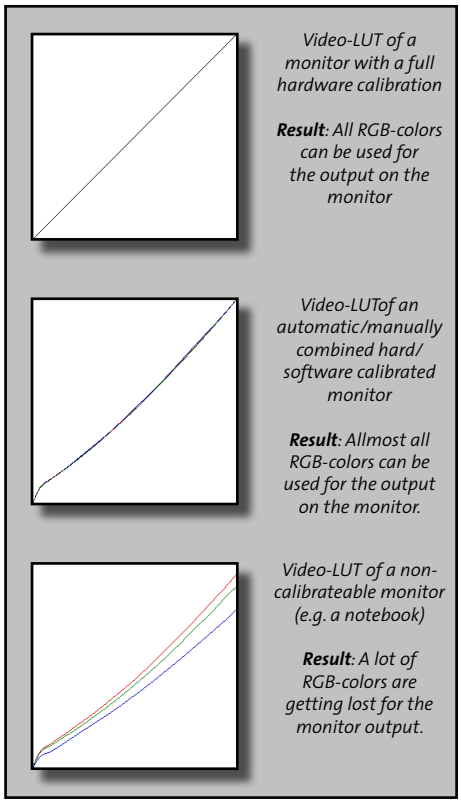
- Konica Minolta FD-7/5
- X-Rite Eye-One Pro
- X-Rite Eye-One Monitor
- X-Rite ColorMunki

Note: *Please be informed that not all instruments are supporte by all operating systems!*
Some older instruments are not supported by the latest operating systems and some newer instruments are not supported by older operating systems.

4.2 Monitortype

A correct calibration of your monitor is the basis for a good profile. The better you pre-adjust the monitor hardware to the desired display characteristics, the better the quality of the resulting profile. By calibrating the monitor you will improve the representation of all colors because the profile conversion will have to correct for less and smaller differences.

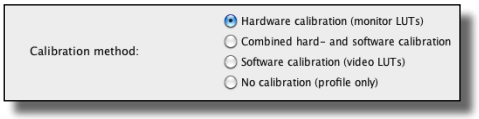
basICColor display offers three different calibration methods. At first launch it will automatically select the highest level method available for your monitor/video card combination. When you quit the application, the calibration method you may have selected manually, will be stored and recalled next time you use basICColor display.



4.3 Calibration method

A correct calibration of your monitor is the basis for a good profile. The better you pre-adjust the monitor hardware to the desired display characteristics, the better the quality of the resulting profile. By calibrating the monitor you will improve the representation of all colors because the profile conversion will have to correct for less and smaller differences.

basICColor display offers three different calibration methods. At first launch it will automatically select the highest level method available for your monitor/video card combination. When you quit the application, the calibration method you



may have selected manually, will be stored and recalled next time you use basICColor display.

4.3.1 Hardware calibration

Hardware calibrateable monitors are connected to the computer via a digital data connection. This could be a DDC/CI video cable or a separate USB or serial cable. basICColor display uses this connections to directly control the monitor and to calibrate it automatically, based on the results of your measurements.

This functionality is only available for selected, hardware calibrateable monitors (see „HW_Support_List.txt“ in the basICColor display program folder).

LCD-monitor

LCD flat screens

LCD monitors normally use a backlight with defined lighting characteristics. Colors are generated by filtering this light source with liquid crystal filters.

Simple LCD monitors work with internal signal processing with 8bit accuracy (256 steps per primary color). Depending on the desired white point (e.g. D50) the intensity of one or more channels must be reduced considerably. This results in a loss of a considerable amount of steps in the colors that have been reduced and thus in a loss of display quality. The result is banding. Highlights and shadows can also be affected.

Hardware calibrateable LCD monitors work with signal processing of 10 or more bits per channel (e.g. 10 bits = 1024 steps).
If one channel should be reduced to 50% there will be enough remaining data to describe the 256 steps of the color signal sent to the monitor. This means that there is differentiation between all the colors, they do not get clogged up.
This alone does not make a monitor hardware calibrateable. The monitor needs to be able to communicate with the calibration software. Besides the white point (color temperature) and luminance, some hardware calibrateable monitors allow for controlling gradation curves so that no correction needs to be done in 8 bits on the video card (e.g. the NEC SpectraView series).

CRT monitors

Hardware calibratable CRTs need to be connected to the computer via a digital data connection. That way color temperature, brightness and contrast can be controlled. CRTs do not have any means to control the gradation curves. The correction of the monitor gradation needs to be done with video-LUTs in the video card. These are stored in 8 bit accuracy in the ICC-profile.
Hardware calibratable CRTs are not supported by basICColor display. All the parameters a hardware calibration would set


CRT-monitor

automatically can be set manually, but instrumented with the help of „Hardware setup“ in basICColor display.

For optimal calibration and profiling results for soft proofing and high-end image retouching, basICColor recommends the use of hardware calibratable LCD monitors.

4.3.2 Combined hard- and software calibration

Some modern monitors are offering a partial calibration in hardware (i.g. Apple displays or some NEC MultiSync displays). This means some adustments of the monitor can be done in hardware directly and some adjustments have to be done via the graphic card's video LUT (Look up table).basICColor display is able to address this parameters of the display directly in the hardware for some types of monitors (see *HW_Support_List.txt* in the basICColor display application folder).

4.3.3 Software calibration

The monitor hardware needs to be set manually by the user, using monitor controls or the on-screen-display (OSD). basICColor display assists you in setting these parameters with measurements from your monitor instrument.
Like in CRTs, the gradation settings are not accurate and need to be corrected via video-LUTs. These are stored in the ICC-profile and downloaded to the video card on system start-up.

LCD flat panels

Some LCD monitors offer near to none of these control options (e.g. notebook monitors). Some of them have a brightness control only, which dims the backlight (not to be confused with CRT's brightness control which sets the luminance of the black point).

Due to the necessary correction, these monitors are not suited for color critical work or for soft proofing.

LCD monitors with an analog connector only will yield inferior calibration quality altogether.

Higher quality LCD monitors (like the NEC MultiSync family of monitors) offer 10 or more bit data processing. Only this type of monitors satisfies higher quality demands.

These monitors offer settings for black and white luminance and white point.

CRT - monitors

In CRTs the intensity of the 3 phosphors is controlled by an analog signal that can be modulated nearly infinitely variable. Since the intensity of each channel can be controlled individually (gain), the color temperature can be set very exactly. Gradation curves in a CRT can not be influenced, each monitor has it's more or less fixed gamma. That's why a CRT can not be calibrated in hardware completely.

Mac OS X

The color management framework of OS X (ColorSync) automatically detects the presence of calibration curves in an ICC-profile and downloads them into the video card at system start-up or when allocating a different ICC-profile using the monitors control panel.

Windows

Some older Windows color management frameworks (ICM) does not support this functionality, a separate LUT-loader is required. basICColor display contains such a LUT-loader which is installed automatically into the start-up programs folder when installing basICColor display

At Windows start-up the LUT-loader downloads the calibration curves into the video card. When changing the monitor profile, the LUT-loader must be launched manually in order to download the correct LUT.

The downside of a software calibration, compared to hardware calibration is the reduction of tonal values by using 8 bit LUTs in the video card. Depending from the extent of the correction, banding and reduced definition in highlights and shadows can be then consequence. This effect is annoying in technical vignettes, but it’s not so visible in photos.

4.3.4 No calibration

In the worst case the graphic card does not support video LUT download (some PC graphic cards). The monitor must then be characterized in it's present state. Corrections for color temperature and tone curve are not available in this mode. Also, adjustment of luminance and contrast can only be done manually.

basICColor display supports you with measurement values in setting these parameters.

Should the graphic card contain a LUT when launching basICColor display it will be taken over and saved in the ICC-profile.

It is understandable that the results achieved with this method are far from being optimal.

4.4 Calibration preset

Under this section basICColor display offers you some standard calibration presets for the most common work-flows. When selecting a calibration preset, all the necessary settings will be done automatically by basICColor display. You don't have to select all the calibration options like "Color temperature", "Tonal response curve" etc. separately.

Using this option speeds up the calibration and profiling process and makes working with basICColor display much easier.

You can even make your own presets. Please find a detailed explanation in the extended part of the manual (chapter 4). If you like one of the presets, or if you made your own preset then just select the set which you like to use for calibrating and profiling your monitor and go on with the next step. You can select one of the following presets:

Softproof - This is the recommended preset to use a monitor in a softproof enviroment.

Photography Outdoor - This set contains optimized settings to be used for judging images in an outdoor set.

Photography Indoor - If you want to use your monitor to judge images in an indoor set your monitor should be calibrated by using this preset.

Webdesign - This preset will set up your monitor for a webdesign worklfow.

Prepress - This preset contains the correct settings to calibrate a display to the needs of the Prepress-Workflow.
Besides this preset is can be recommended to photographers who wants to retouch their images for the output of an photo-lab, Fine-Art-Printers, Inkjets or other printing devices.

DICOM LUT - This preset can be used to optimize your monitor for an medical workflow.

CIE LUT - This is another preset to set up the monitor for a CIE based medical workflow.

Adobe RGB (1998) - The monitor will be set up to optimized for an AdobeRGB workflow by using this preset.

custom... - If any setting of an existing preset will be changed then the name of the preset changes to “custom...”.

Some of those presets are already represented by a workflow-icon in the main window of basICColor display.

An exception is the last workflow-icon of the main window of basICColor display. The default setting for it is “custom”. But this workflow-icon is a placeholder for a whole list of calibration presets. The name and the preset which are represented by this workflow-icon can be changed.

It is possible to select between all calibration presets except those which are already represented by a workflow-icon.
To change the calibration preset for this workflow-icon make a right-mouse-click on the icon.

After the selecetion of a calibration preset the look of the workflow-icon won't change. But the name under the workflow-icon will change to the name of the selected calibration preset.

The calibration settings which are represented by workflow-icon can be seen in the middle of the main window of basICColor display.
If the custom workflow-icon will be used to create a calibration and profile for the display these new settings will be used then.

4.5 Creating custom calibration presets

A calibration presets contains settings for the parameters of “Presets”, “Color temperature”, Tonal response curve”, “Luminance/contrast ratio” and “Profile”. By combining these settings to a calibration preset the single options don’t have to be selected each time you want to use a defined combination of calibration parameters. This will makes basICColor display very comfortable and fast to use.

As mentioned in the previous section a single change on a parameter will rename the calibration preset form it’s original name to the name “custom...”.

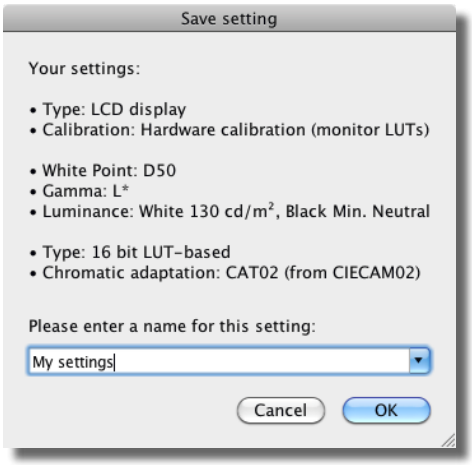
At this point basICColor display gives the user the opportunity to save these new calibration settings as a custom calibration set with it’s own name.

To save the calibration settings as new set, please select “File -> Save presets...” from the main menu of basICColor display. Alternatively use the shortcut ⌘**S** to get to the same dialog.

In the dialog for saving the new calibration preset all the selected calibration parameters are listed. At the bottom of the window is a field where the name of the new calibration preset can be defined.

By a click on the **<OK>**-button the new calibration preset wil be saved and the dialog will close automatically.

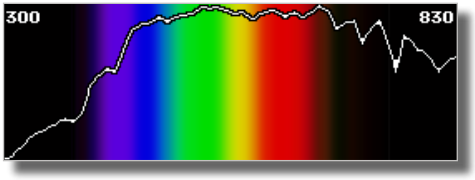
The new calbration set can be chosen from the list of calibra-



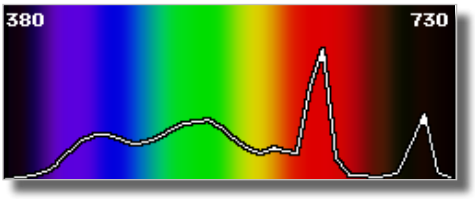
tion presets like any other predefined calibration preset. It's possible to activate the new created calibration preset via the custom workflow-icon in the main window of basICColor display.

4.6 Color Temperature

If you heat up a black body you will see that it radiates light. The spectral distribution of the emitted light can be correlated with the temperature of the black body. Any light's color temperature is the temperature in kelvins (K) at which the heated black-body radiator matches the hue of the light.



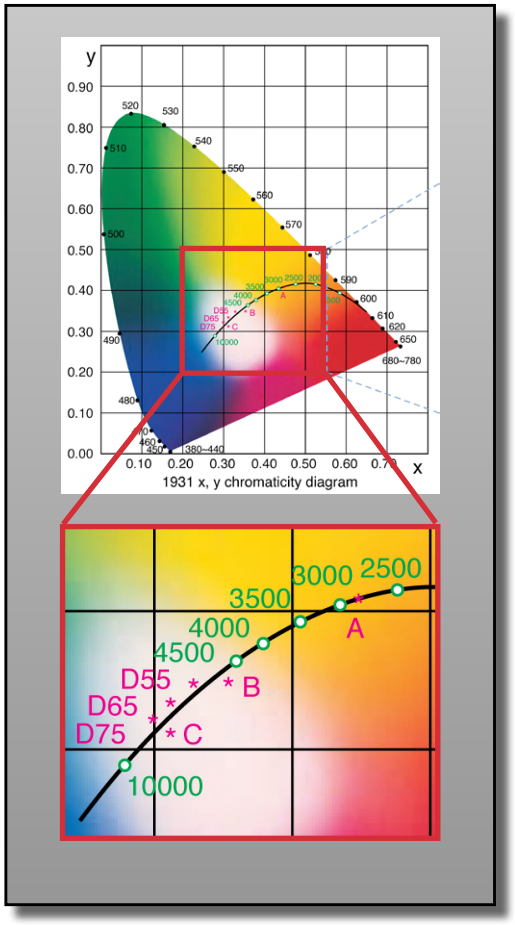
D50 spectral distribution curve



„D50" spectral distribution curve of a CRT monitor

The lower the color temperature, the more yellowish/reddish the emitted light (e.g. incandescent lamp -> approximately 2800 K). The higher the color temperature, the more blueish the emitted light (e.g. not calibrated CRT monitor -> approx. 9300 K).
Color temperature only describes a certain color sensation, not a specific spectral distribution. So, it's unknown, how the measured x and y values are composed spectrally. The CIE (Commission Internationale de l'Eclairage) have de- fined spectral distributions of standard lighting situations, the most important of which is the D-series (D = Daylight).

basICColor display offers quite a lot of different possibilities to make a selection for the color temperature.



D50

For the graphic arts industry, D50 is the standard for viewing and comparing color. Also the color systems L*a*b* and XYZ as we use them in graphic arts, are based on this illuminant. These are the reasons why a computer monitor in an ICC-compliant working environment needs to be calibrated to D50.

D65

This is the standard illuminant for the manufacturing industries (automotive, textile etc.), office and video production. If you are in one of these trades, you should calibrate your monitor to D65.

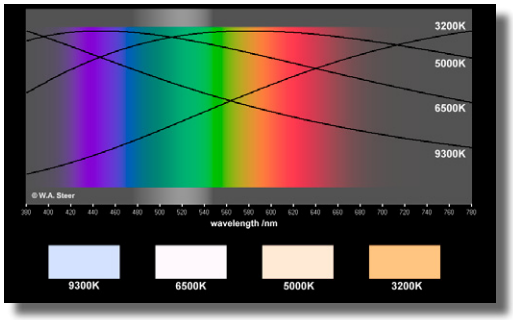
Other Dxx

For specific purposes it may be advisable to calibrate to a different daylight white point. Enter the full correlated color temperature here (e.g. 7500)

Monitor's native

Each monitor has it's own, typical white point, that is displayed when all 3 channels, R, G and B (Gains) are set to max. With this setting he luminance and gamut of the monitor are at their maximum.

„Monitor's native" is not recommended for color critical work in an ICC workflow. This setting may be useful for laptop monitors if their luminance is inadequate after calibrating them to D50.



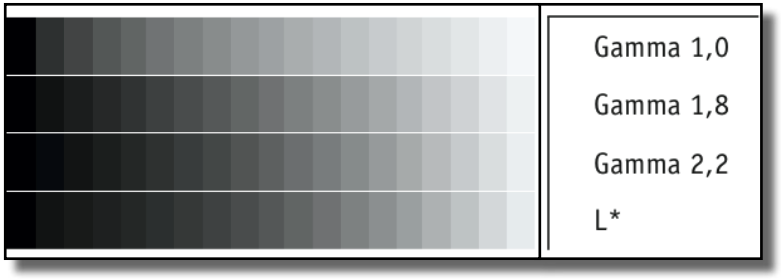
Blackbody temperature

As described earlier, an illuminant can be characterized with its correlated color temperature. D50 for example has an approximate color temperature of 5000K, but the blackbody radiator has a different spectral distribution at 5000K.

Monitors show a different, characteristic spectral distribution, their white point can only be approximated.

4.7 Tonal response curve

Shades of gray from black to white will be reproduced in a specific way, depending on the individual monitor. CRTs and LCDs are very different in their native characteristics. In order to normalize the response character monitor calibration corrects the tonal response curves to a defined function.



L* (recommended)

Theoretically, the ideal color system for cross media publishing is L*a*b*. It equals the characteristics of human color perception. So, it is logical to combine the advantages of the L*a*b* with the representation of tone values on a monitor.

The L* method calibrates your monitor in such a way that gray scales appear visually equidistant. If you increase the R, G and B signals by the factor 2, the displayed color will be doubled in brightness. This way the RGB monitor space is optimally adapted to the human visual sensation.

Since ICC profiles are based on L*a*b* as well, the conversion losses are minimized when converting color to the monitor gamut. If you calibrate your monitor to L*, your RGB working space should have an L* tonal response curve also. You can download such a working space (ECI-RGB v2) from www.eci.org.

Gamma

The Gamma function is based on the native behavior of CRT monitors. In CRTs, an electron beam excites red green and blue phosphors on the tube's surface. Depending from the intensity of the electron beam, the phosphors glow more or less bright.

Yet the intensity is not directly proportional to the voltage that controls the exciting electron beam. The ratio equals a gamma function. This gamma function can easily be modified into a different gamma behavior.

In the early days of monitor calibration, it seemed a good idea to calibrate a monitor to a gamma that is similar to the tonal response of printed matter, to be precise, gamma 1,8 was the characteristic of an Apple LaserWriter. Thus gamma 1.8 became the typical Apple monitor gamma. On a PC, where you normally did your bookkeeping, wrote letters and prepared presentations, a more contrasty characteristic was desirable. Thus gamma 2.2 became the typical PC gamma.

In a color managed environment these historic gammas do

not make sense any more. For one, because LCD monitors show a completely different native tonal response, on the other hand the monitor profile compensates for different tonal curves anyway. So it makes more sense to calibrate your monitor to a tonal response curve that affects the data you want to display the least: L*.

The only use of a gamma calibration is a workflow with data which need to be displayed with a certain gamma or other tonal response curve (e.g. video or web design = sRGB) out- side a color managed environment. In all other cases, L* calibration is the better choice.

RGB IEC61966-2.1

sRGB is a working space for monitor output only. You find it mainly in the areas of Internet, multi media video and office applications. The tonal response curve cannot be described with a gamma function (although Photoshop, for example, reports a gamma value of 2.2). In the shadows, it resemble more an L* curve, in the mid tones and highlights it follows the gamma 2.2 curve. In order to exactly match sRGB data, SpectraView Profiler is the only monitor calibration application that offers an sRGB calibration curve for these applications.

CIECAM02

How the effective contrast ratio will be reproduced in an workflow doesn't depends on the monitor alone. Also the lightning conditions of the room is having a lot of influence on the effective contrast ratio of the monitor.
In a very bright en lighted room the effective contrast of the monitor will not be the same like using the same monitor in the same room, but without any additional light sources and closed curtains (e.g. dark room).

One part of CIE Color Apperance Model 02 (CIECAM02) is to take care about the luminance of the ambient light of the room. The monitors gradation curve can be optimized to the luminance of the rooms ambient light to optimize the effective contrast ratio (combination monitor and ambient light) by choosing on of the CIECAM02 setting.
The NEC recommends to use one of the following settings depending on luminance of the ambient light of the room:

0 - 32 Lux: CIECAM02 - dark

32 - 64 Lux: CIECAM02 - dimmed

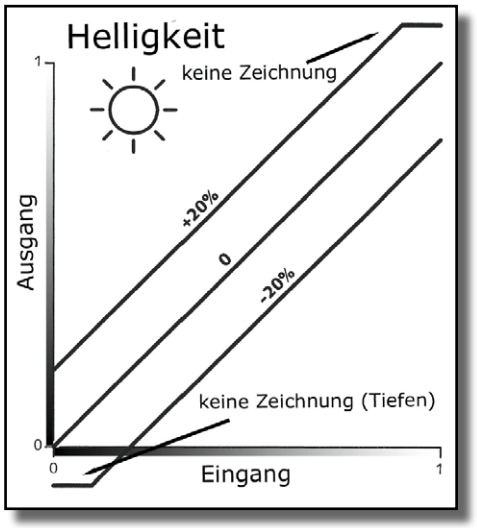
>= 64 Lux: CIECAM02 - bright

The luminance and the white point of the ambient light of the room can be measured with a measurement device which supports ambient light measurements (e.g. basICColor SQUID 2 or X-Rite Eye-One pro).

4.8 Luminance / contrast ratio

Here you can define parameters that are important in different ways.

If you should use several monitors in your environment, it makes sense to harmonize them to the same visual appearance. These settings allow you to do so in different ways.



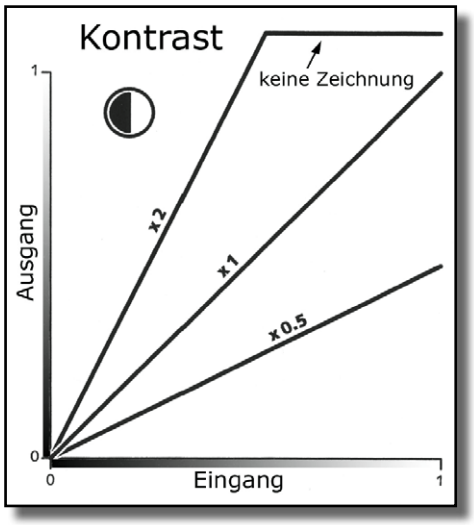
White luminance

The addition of all 3 RGB primaries results in white light of the highest possible quantity of light. That makes white the brightest color a monitor can show.

If you reduce the brightness of an LCD monitor or the contrast of a CRT, the quantity of light and thus the white luminance will be reduced.

All monitors have a different native white luminance. In order to be visually equal, they need to be calibrated to the same maximum luminance. The reference is always the monitor with the least brightness. All other monitors must be adjusted to the darkest one.

In order to determine the max. luminance for a given white point, you need to calibrate the monitor with the „maximum“ radio button checked. In order to determine the luminance of a second monitor, create a white desktop on that monitor, click the „Measure“ button and follow the instructions on the screen.



Tip: Contrast control in LCDs

The contrast control (OSD) of an LCD monitor works completely differently from CRTs. In most cases, there is no need to change the contrast settings. Please reset contrast to factory settings before attempting to calibrate an LCD monitor.

Black luminance

For the visual appearance of a monitor, not only the tonal response curve and the white luminance are of importance, but also the black luminance. basICColor display allows you to calibrate monitors to a defined black luminance. Here the highest black luminance is the reference for harmonizing multiple monitors.

In order to determine the min. black luminance for your monitor, you need to calibrate the monitor with the „Minimum“ radio button checked.

In order to determine the black luminance of a second monitor, create a black desktop on that monitor, click the <*Measure*> button and follow the instructions on the screen.

Contrast

The ratio between brightest and darkest value of a monitor is called contrast ratio. The higher the contrast ratio, the better is the differentiation of tonal values.

If white luminance and black luminance of two monitors are equal, the contrast ratio is the same. So, it is irrelevant if you calibrate to the same white and black luminances or the same luminance and contrast ratios.

Specify

Here you select the two parameters you intend to use for the calibration, the third one will be grayed out and will be calculated automatically.

4.9 Profile

ICC-profiles can use a different internal structure for some parameters. Two important parameters are the profile type and the chromatic adaptation.

4.9.1 Profile type

The function of an ICC profile is to describe the color characteristics of your devices in a device independent color model (e.g. CIELab).

It doesn't make sense to describe all 16.7 million color in a profile, this would result in a huge file. So, only a certain number of color combinations will be described in a profile, the others will be interpolated mathematically.

Matrix based

The simplest way to describe the color properties of a device is a color matrix. It contains the 3 primaries red, green and blue and a function that describes the tonal response curves for the 3 channels.

The main advantage of this profile type is its small size (4 -8 KBytes, depending from the way, your hard drive has been formatted). Matrix profiles are thus best suited for applications where size matters, e.g. the internet.

The downside is that a not so perfect device cannot be described accurately.

16-BIT LUT-based

In this profile type, the gamut of a device will be described in a table of a defined number of points. All other color values will be interpolated. This allows to describe non-linear behavior of a device. The size of a LOUT profile can be somewhere between 200 KB and more than 2 MB.

With 16 bit encoding, the accuracy of a LUT profile will be increased dramatically (256 times more accurate), while the size only doubles. That's why SpectraView Profiler offers 16 bit LUT profiles only.

4.9.2 Chromatic Adaption

Chromatic adaptation is the ability of the human visual system to discount the color of the illumination and to preserve the appearance of an object. Chromatic adaptation can be observed by examining a white object under different types of illumination, such as daylight (blueish) and incandescent (yellowish). The white object retains its white appearance under both light sources, as soon as the viewer is adapted to the light source (discounting the illuminant).

Within the ICC color management system, D50 is the reference illuminant. Should a monitor be calibrated to a different white point (e.g. D65), all colors displayed on this monitor need to be converted so that they appear like they were being viewed under D50 lighting.

Such transformations are called Chromatic Adaptation Transforms (CATs). There has been a significant amount of research in determining CATs that are able to accurately predict color appearance across different illuminants. The transforms currently in use are based on minimizing perceptual error of experimental corresponding color data sets.

none
Is not really no CAT, it rather means: No other than the preferred ICC chromatic adaptation method.

von Kries (HPE)
The von Kries CAT assumes that chromatic adaptation is in- deed an independent gain control of the cone responses of the human visual system, and that the scaling is based on the ratio of the cone responses of the illuminants. Visual result: On a monitor calibrated to a higher color temperature, all colors appear (compared to CAT „None“) a bit warmer and more saturated. The opposite is the case for monitors calibrated to a lower color temperature than D50.

lineare Bradford
A widely used newer chromatic adaptation transform is the Bradford transform. It was empirically derived by Lam from a set of corresponding colors as determined from 58 dyed wool samples with varying color constancy, evaluated under

illuminants A and D65. The original Bradford chromatic adaptation transform contains a non-linear correction in the blue region. In many applications, as in SpectraView Profiler, this non-linearity is neglected. Changes appear less intensive than in the „von Kries“ method.

CAT02 (von CIECAM02)
This is the latest development in CATs, it’s effect is close to that in the „linear Bradford“ method. basICColor display uses CAT02 as a default.

4.9.3 V4 profile

If you check „ICC v4 profile“ SpectraView Profiler will create ICC profiles according to the latest specification (including the correct chromatic adaptation tag).
Under windows, v4 profiles do not make sense since the Windows color management system ICM is not capable of utilizing these profiles (ACE, the CMM built into Adobe products can handle v4 profiles).

4.10 Review

Under this tab you will find some useful quality assurance and editing tools.

4.10.1 Monitor

This tool allows you to check the quality of any profile and calibration, not only those created with basICColor display. After measuring the validation patches you see the „Validation Results“ window. The measured values are compared with the reference values calculated from the ICC profile. For each patch you will find a DeltaE information along with Deltas for L, a and b separately.

display CIE LAB

This check box lets you switch between Lab and XYZ values, it is checked by default.

Tolerancing model

With the radio buttons in the upper right corner of the window, you can switch tolerancing models from DeltaE 94 (de- fault) to DeltaE (Lab). The latter is still the standard method for determining the distance between two colors, while the first is more accurately adapted to the human visual system.

The DeltaE-2000 model is one of the latest tolerancing models. It’s an improvement on the DeltaE-94 tolerancing model. And it’s getting more and more popular in the daily business.

Mounting the ambient light head on a basICColor SQUID2

Positioning basICColor SQUID2 for ambient light measurement.

4.10.2 Ambient light

This does not influence the results of calibration and profiling, it is for your reference only. On the other hand, you can find essential informations that help you set up your working environment.

basICColor SQUID 2 / GretagMacbeth EyeOne display2
In order to measure ambient light, you have to attach the ambient light head.

Gretag Macbeth EyeOne pro
Not all Eye-One spectrophotometers support ambient light measurements, you need one that came with the „Ambient Light Head".

For ambient light measurement, basICColor display offers reference data for three different situations. Check the radio button that represents the desired situation.

In order to measure ambient light, click <*Measure*>.

10.4.3 Ambient Light

In order to be able to judge colors accurately on a monitor, you need a controlled environment as described in ISO 3664 and ISO 12646.
These standards demand for a dimmed surrounding with a

Mounting the ambient light head on a GretagMacbeth Eye-One Pro

Positioning of the GretagMacbeth Eye-One Pro for ambient light measurement

not more than 32 lux and a color temperature close to D50.

Attach the ambient light head to the instrument and hold the instrument in front of your monitor with the ambient light head facing the room, not the monitor.

10.4.4 Check viewing booth

For a comparison of a proof and a soft proof, the viewing booth should have an illuminance value of 500 ± 125 lux and a color temperature of D50.

Again, attach the ambient light head to the instrument and hold the instrument towards the back wall of your viewing booth. Make sure the background is a neutral gray. In doubt use a gray card that has no metameric failure, like the basICColor gray card.

In the measure window, you'll see the measurement values updated with each measurement. Thus you can adjust your ambient light or viewing booth until the required values have been reached.
Click **<Done>** and then **<Close>** when you want to stop measuring. The achieved values will be displayed next to the reference values so that you can compare the results.

Viewing booth for hardcompy comparison only
A viewing booth that is being used for comparing print and proof, is supposed to show an illuminance value of 2000 lux ± 500 lux and a color temperature close to D50.

Attach the ambient light head to the instrument and hold the instrument towards the back wall of your viewing booth. Make sure the background is a neutral gray. When in doubt, use a gray card that has no metameric failure, like the *basICColor gray card*.

4.10.5 Adjust viewing booth

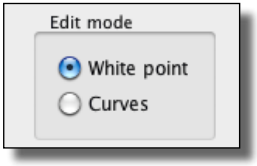
Using this setting will adjust the lightbooth's brightness to the brightness of the monitor. Only then it will be possible to compare a photographic print, proof or any other artwork with the display on the monitor.
basICColor display communicates with the lightbooth and will automatically adjust its brightness to the monitors brightness. Please take notice that the monitors brightness should be set to a standardized value. The ISO 3664 requires a luminance of 500 +/- 125 lux.
Other settings are also possible but then they are not standardized and other users may not have the same exposure at their facilities.

Viewing boot for hardcopy comparison only
By using this setting the light booth will be automatically adjusted to a luminance of 2000 lux. This is the standardized luminance to compare artwork, photos and/or press prints to proofs.
This setting should not be used to compare (e.g. a proof) with the display on the monitor.

other value/other value (emission)
To be not bound only to standard settings, it is possible to adjust the lightbooths luminance to a custom value. The values can be entered in the measuring units Lux (lx) or candela per square meter (cd/m²).

4.10.4 Edit calibration

In principle there should be no need to edit the calibration performed by basICColor display. There are rare occasions when the monitor still shows a color cast after calibration

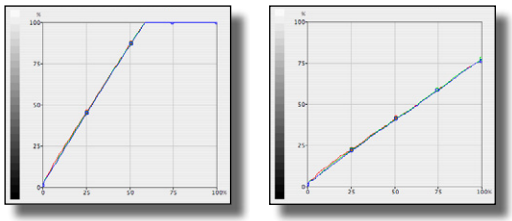


(depending from the filter set in the instrument and the phosphor or LCD filter set of the monitor). In these cases you can edit the calibration curves manually. basICColor display offers two edit modes:

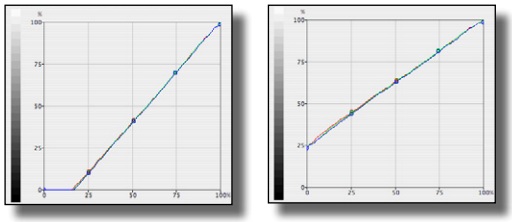
White point

In this mode you can influence the brightness in all three channels or in 1 selected channel without affecting the shape of the calibration curve. If you click and drag the white point, you reduce or increase white luminance in the selected channel. Once you have reached 100% and continue dragging, contrast, but not the intensity will be increased, but you will lose definition in the highlights.

If you click and drag the black point, you can increase black luminance in the selected channel, which affects the contrast ratio as well.



White point edit: On the left, the white point was raised. You can see how many colors turn to white. On the right, luminance and contrast have been reduced



Black point edit: On the left, the black point was reduced. You can see how many colors turn to black. On the right, luminance was raised which results in a reduced contrast

Curves

This option allows you to change the shape of the tonal response curves with three additional handles.

Edit curve(s)
Here you select, which curve(s) you want to edit.

All - All Curves are affected in the same manner.

Red - Only the tonal response curve of the red channel will be affected. Blue and green channels remain unaffected.

Green - Only the tonal response curve of the green channel will be affected. Red and blue channels remain unaffected.

Blue - Only the tonal response curve of the blue channel will be affected. Red and green channels remain unaffected.

Undo - Undo the last change.

Reset - Revert curves to the LUTs stored in the profile.

Save - Write curves into the active profile.

4.10.5 Color Space Emulation

Some high-end monitor have an internal 3d Look-Up-Table (3D LUT) which allows it to manipulate the color charakteristics of the display. This makes it possible to emulate the shape and size of a different color space instead of using the native color gamut of the display. This means a wide-gamut display with a color gamut of about 100% of AdobeRGB (1998) can reduces in it's gamut to e.g. the shape and size of an sRGB-display.

When a monitor emulates a color gamut it's not possible any more to show higher saturated colors than the colors of the emulated color gamut. Even when the monitor is able to show those colors in it's native color gamut!

Excluded from the emulation of the color gamut is the white point and the tonal response curve of the monitor (and of course the black- and white-luminances).

Tip: *If a Wide-Gamut display should emulate a color gamut as good as possible then the color temperature and the tonal response curve should be calibrated to the native settings of the color gamut which should be emulated.*

To activate a Color Space Emulation on supported displays just select an ICC-profile from the list. All ICC-profiles which are installed on your system are listed

To activate the Color Space Emulation click on the <Save>-button at the bottom of the window.

Chapter 5

Preferences

5. Preferences

To open the preferences of basICColor display press ⌘,.
In the preferences some settings for the work with basICColor display can be selected.

Please mention that some of the settings become active after a restart of basICColor display.

5.1 General

In this tab the general settings for basICColor display can be set up.

5.1.1 Language

Select the language basICColor display should use from this menu.

5.1.2 Measurements

Additionally you can define if yo want a click tone with every measurement.

5.1.3 Calibration options

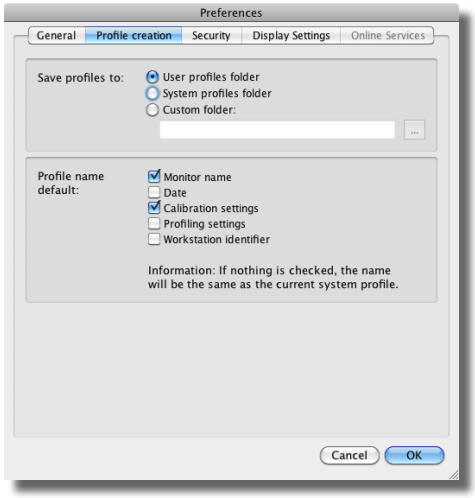
When this check box is active basICColor display uses less color patches to create a calibration and the profile.
It will speed up the application, but it is less accurate than using more color patches.

5.1.4 Path to the analysis software (catch)

basICColor display can send the measured values to an external quality control software (basICColor catch) for a more detailed review.

Please enter the path to the basICColor catch folder into this field.

For more information about the detailed review in basICColor catch, please consult the documentation of basICColor catch.



5.2 Profile creation

In this tab some presets for the profile creation can be set up.

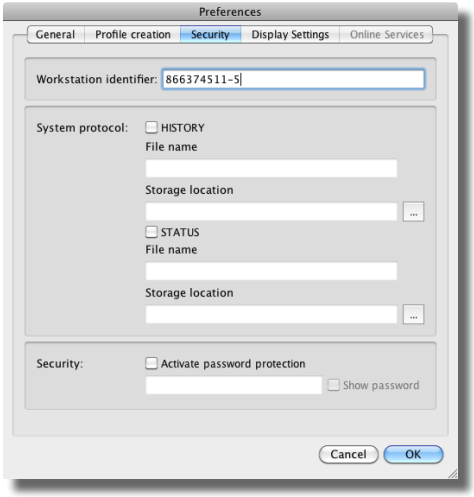
5.2.1 Save profiles to

This dialog allows you to specify the folder for storing the ICC-profiles you create. (For the System profiles folder you will need administrator rights, for the user profiles folder, standard user permissions are sufficient).

If you want to save the created profile into an alternative folder you can select this custom folder here too.

5.2.2 Profile name default

By default basICColor display names the created profiles some preselected phrases. By activating a checkbox this phrase will be added to the profile name.

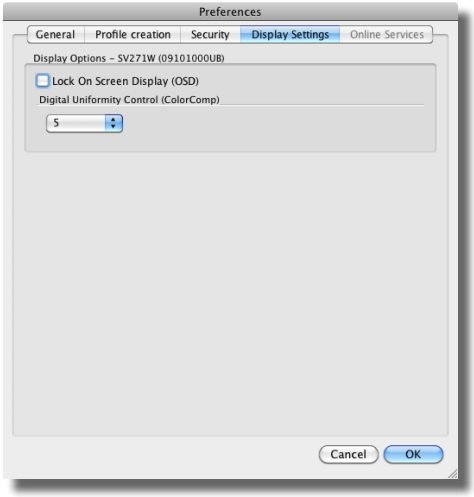


5.3 Security

In this section you can define a station ID, if more than one softproof-stations have to be administrated. If you leave the field blank, the machine ID will be inserted.

Additionally you can specify name and path to the protocol files, i.e. to create copies of protocol files on a network storage.

You can also activate password security which allows the start of basICColor display only after entering the correct password.

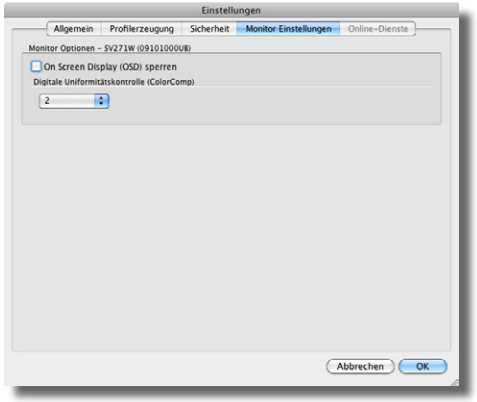


5.4 Display settings

Some monitors offer additional hardware settings which are not part of a pure calibration (e.g. NEC SpectraView Displays). basICColor display can control and change this additional settings.

So it's possible to lock the OSD (On-Screen-Display) of NEC displays by activating the check box in this tab.

Additionally some displays like the NEC SpectraView series allow it to change the settings for the Digital Uniformity Control (ColorComp).



5.5 Online-Services

This feature is supported in a future version of basICColor display.

5.6 Settings in the main menu

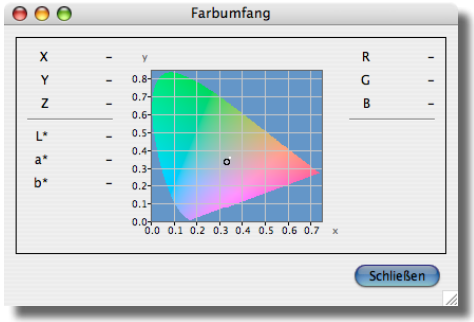
basICColor display additional function can be activated directly through the main menu of basICCor Display.

5.6.1 Select system profile...

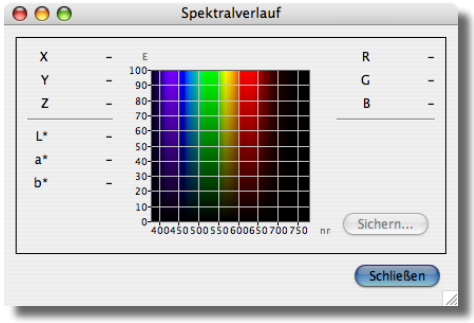
At startup time your computer system loads the active system profile. Under Mac OS X the video-LUT that stores the monitor calibration information will be downloaded into the video card. A Windows-PC needs a separate video-LUT loader for this task. This application is being installed to the Startup Programs folder when you install basICColor display.

If you use a hardware calibrateable monitor, neither of the operating systems provides a mechanism to download LUTs into the monitor. Normally this information is stored in the monitor at calibration time and stays there permanently.

If you change profiles (e.g. for different workflows - photo and video), you need to reload the appropriate video-LUTs. basICColor display lets you perform these tasks with one click. Go to the „File“ menu „Select system profile...“ and navigate to the desired ICC-profile.



XY-graph of a measurement value in the Chromaticity and Gamut window



Spectral distribution for the same measurement

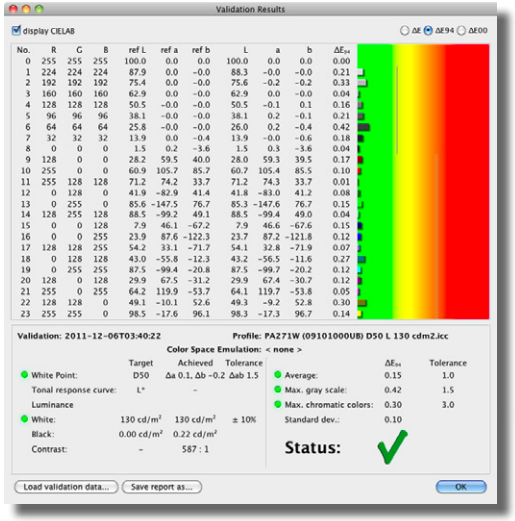
5.6.2 Chromaticity and gamut / Spectral distribution

In the menu „Window -> Chromaticity and gamut“ or with the shortcut ⌘**2** you open an additional window that shows the actual measurement in an x-y diagram.

On the left you see the measured X,- Y- and Z- values as well as L*, a* and b*. On the right you see the corresponding RGB-values.

Once measured, the primaries Red, Green and Blue define a color triangle, the gamut of your monitor, in the x-y diagram.

In the menu „Window -> Spectral distribution“ or with the shortcut ⌘**1** you open an additional window that shows the spectrum of the actual measurement. This option is only available if the measurement instrument used is a spectro-photometer.
Click on the <*Save*> button to store the spectrum in an ISO-12642 compliant text file.



5.6.3 Validation results

The last validation result can be opened by holding ⌘**i** or by selecting “Window -> Validation results...” from the main menu.

Chapter 6

Product information basICColor display

6. Produkt Information basICColor display

Copyright Information

Trademark Information

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