

# reference



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by Color Solutions Software

basICCaliCube

# manual

# overview

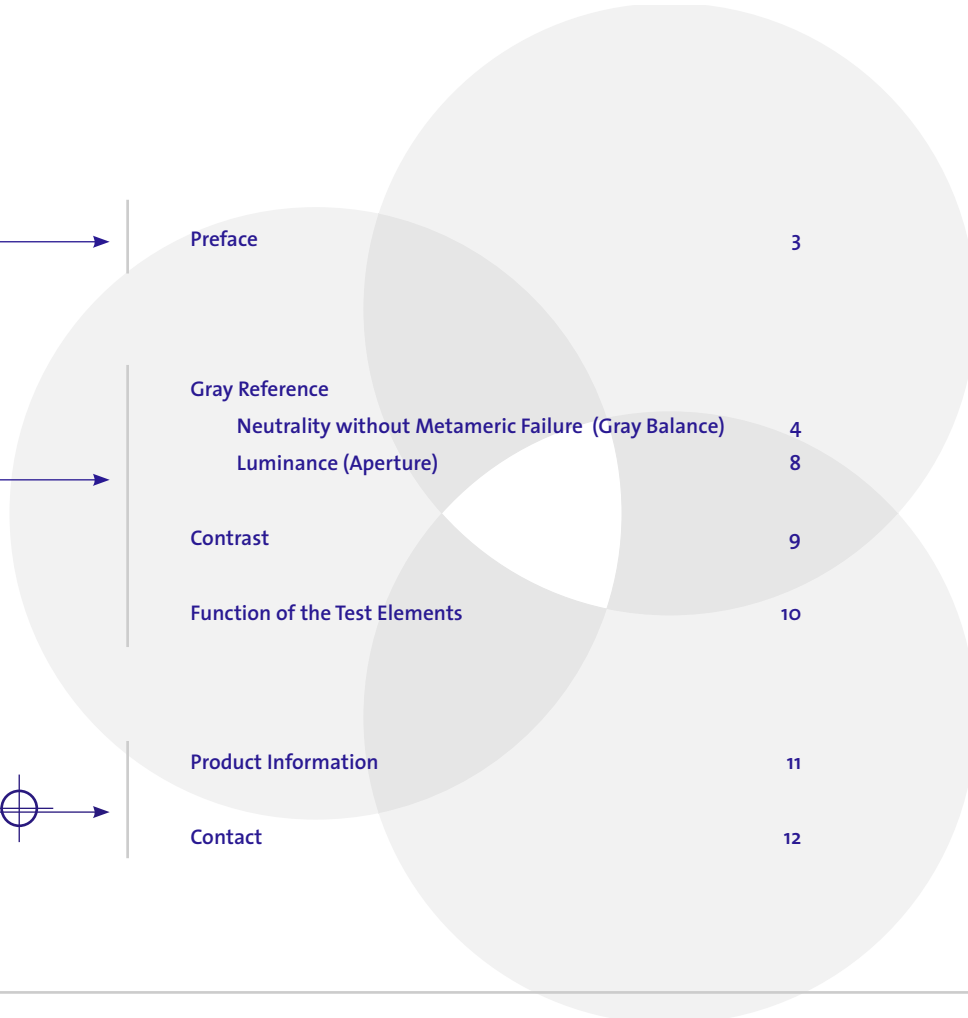


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# introduction



## Preface

## basICCaliCube



Thank you for purchasing a *basICCaliCube*. You have acquired a very versatile control tool for digital Photography. You can use this tool most efficiently in a RAW-workflow. In addition to the functionality of a gray card, the *basICCaliCube* offers some more features for controlling your camera:

- The integrated chrome ball allows to control the catchlight
- The built in black trap allows to control the absolute shadow.
- In a RAW-workflow it allows to use all calibration functions during the RAW conversion, using the eyedropper
- in a JPEG-workflow you can use the *basICCaliCube* during image correction.

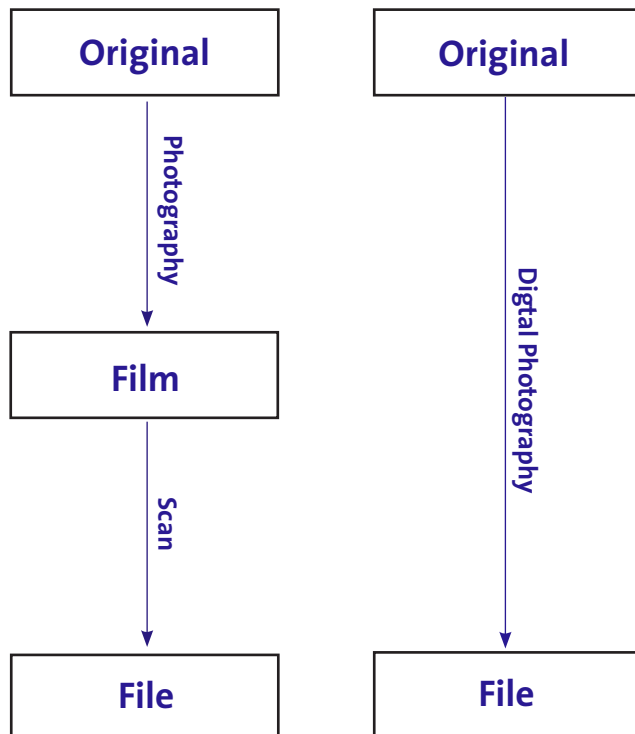
In order to accelerate your workflow, the *basICColor gray card* should be used for gray balancing your camera in a JPEG-workflow.

Together with the desktop background files the *basICColor gray card* can be used for checking monitor calibration and setting the luminance of your viewing booth (if dimmable). Combined with a spectrophotometer, ambient light can easily be measured. In digital photography the gray card can be used for white balance and as a digital exposure meter. In combination with a spectrophotometer it can also be used for measuring ambient light.

Although the *basICCaliCube* is a useful tool for settings in your RAW-converter or imaging software, it is not supposed and it cannot replace monitor calibration and profiling. The *basICCaliCube* is there to speed up work through consistent and controlled measure-points which can easily be measured with the eyedropper. A calibrated and profiled monitor helps to assess the overall color impression of an image. Visual "calibration" with test charts will never render satisfactory results. Normally a monitor offers only contrast and brightness settings, maybe a color temperature setting which usually is very inaccurate. Neither do they offer a gamma control nor useful information about primaries or gamut. Monitor calibration and profiling should be performed with a spectrophotometer or colorimeter. Informations on *basICColor display*, the reference application for monitor calibration and profiling, can be found at: <http://www.basICColor.de>.



### Gray Card for Digital Photography and Pre Press



Digital photography offers the user a wide range of new possibilities. Color fidelity in particular can be improved tremendously. Instead of two conversions (Original -[Photography]- Film, Film -[Scan]- File) only one is required (Original -[Photography]- File). Color conversion from original to film is obsolete. That is the step which is not easily controlled, while scanning delivers very exact color reproduction when colormanagement is applied. Merging of the capture and the scanning process in digital photography eliminates color problems in film that otherwise cannot be corrected. In order to achieve exact color reproduction, the digital camera needs to be calibrated and profiled - just like the scanner in a conventional 2-step process.

Varying lighting conditions present a special challenge in digital photography. While all ICC-compatible programs (camera software, Photoshop, InDesign, RIPs,...) are based on the internationally (through ISO standards) standardized lighting D50 (daylight, 5000 Kelvin, equals approximately sunlight at noon), photographers are dependent on the actual lighting in the present scene. While it is necessary to standardize viewing conditions as a basis for color conversions due to a vast variety of substrates, processes (photo paper, inkjet printers, laser printers, offset, gravure, thermo transfer,...), daylight is ever changing and does not very often equal D50. Unfortunately even artificial light sources like studio flash lights do not show a spectral distribution similar to D50.



**Standard Illuminant D50**

# manual



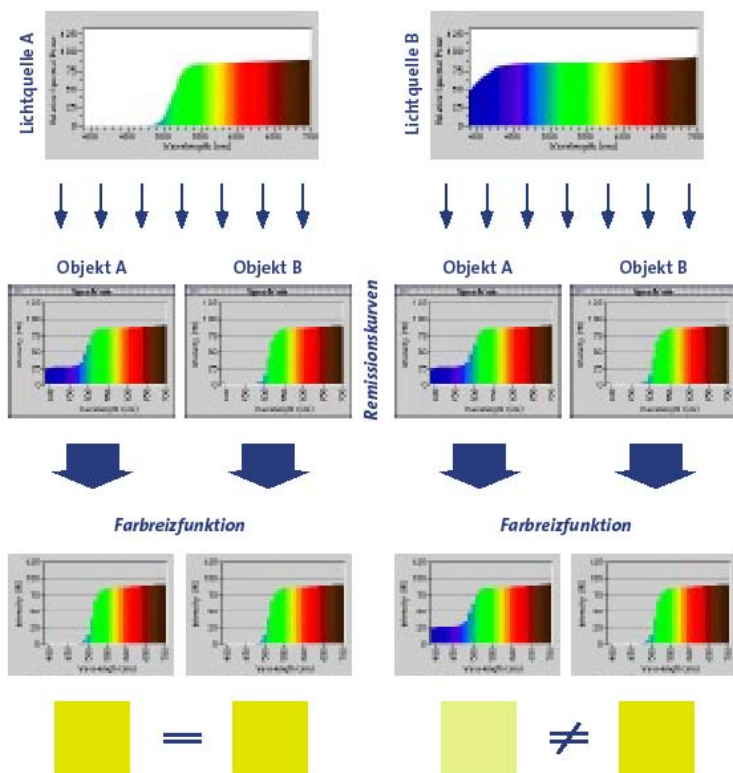
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## Gray Reference - Neutrality

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Relative Spectral Distribution



When working with different illuminants, metameric failure will occur regularly. The color of two objects will look the same under one light, but they differ under another light. In everyday life you see this effect when shopping for clothing - clothes match under shop light and do not match under sunlight – or vice versa.

The white balance target bears a special relevance in respect to metamerism. If the photographer uses a metameric gray card for this purpose, all images taken under a non-D50 lighting situation will produce a color cast, although the camera had been calibrated to gray. The cast depends upon the type of metameric failure. This effect is known for most gray cards, even from well known manufacturers in the photographic industry. That's why Color Solutions developed the *basICColor gray card*. Because of its spectral remission properties, it is nearly free of metameric failure. The color shift under different lighting situation remains way under the threshold of visual perception. Or, in brief, the *basICColor gray card* looks the same under all viewing conditions: gray without a cast.

For your reference, you find comparative measurement data of the most common commercially available gray card and the *basICColor gray card* on the next page. Neutral gray without a color cast is identified by its lightness  $L^*$  (absolute black:  $L^*=0$ , ideal white:  $L^*=100$ ) and  $a^*$  (red-green axis) as well as  $b^*$  (yellow-blue axis) being equal to 0 in the  $L^*a^*b^*$  color model. The threshold in visual perception is approximately 1 unit (Delta E) for the average human observer. A color cast will be perceived as a bigger difference than a difference in lightness.

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## Gray Reference - Neutrality

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### Comparison table:

Lighting	<i>basICColor gray card</i>		other gray card	
	a*	b*	a*	b*
Standard illuminant A	-0,26	-0,46	-0,46	+2,24
Standard illuminant C	-0,10	-0,42	-1,52	+2,59
Standard illuminant D50	-0,18	-0,41	-1,11	+2,48
Standard illuminant D65	-0,13	-0,39	-1,51	+2,63
Standard illuminant F2	-0,06	-0,48	-1,17	+2,66
Standard illuminant F7	-0,07	-0,44	-1,58	+2,63
Standard illuminant F11	-0,12	-0,53	-1,52	+2,70
Standard illuminant F12	-0,17	-0,53	-1,24	+2,83
Standard illuminant D75	-0,11	-0,38	-1,71	+2,69
Metameric Failure	0,20	0,14	1,25	0,59



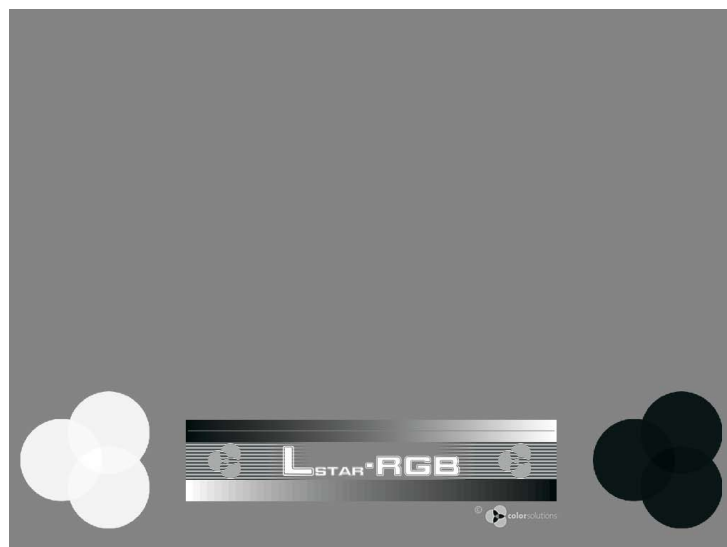
Measurements were taken with an X-Rite 939. Since the other gray card contains optical brighteners, we measured with UV-cut filter (in favour of the other gray card). Measurement data for the *basICColor gray card* are exactly the same with or without UV-cut filter, while the other card differs in the b\* value by approximately 1 unit. While the *basICColor gray card* shows a\* and b\* values way under 1 for all lighting conditions (with a variation of less than 0,2), the other card has a visible greenish-yellow cast with a metameric failure of up to 1,25 Delta b\* and 0,59 Delta a\*. This is a visible difference for the human observer, but much more so for a digital camera. For your reference: Standard illuminant A has a color temperature of 2856 Kelvin, D75 has 7500 Kelvin F2, F7, F11, F12 are fluorescent lamps.

# manual



## Gray Reference - Neutrality

### basICCaliCube



Color Solutions desktop background

For all these reasons the *basICColor gray card* is perfectly suited as a reference for gray and lightness comparisons for all systems used in digital photography, especially in combination with the Color Solutions desktop background.

- White balance of digital cameras for profiling and shooting
- Exposure meter (digital via color picker with profile active, analog with correction factor)
- Lightness setting of viewing booth and monitor (visually and instrumented)
- Light meter for adaptation of color temperature between monitor and viewing booth
- visual check of monitor calibration

The *basICColor gray card* was developed with the production principles of the ECI in mind (more free information under [www.ECI.org](http://www.ECI.org)). From there you can download the working space eciRGB which is based on a gamma of 1.8. The more advanced version of a working space, LStar-RGB, can be downloaded from [www.LStar-RGB.com](http://www.LStar-RGB.com). LStar is also the tonal response curve, monitors for imaging work should be calibrated to. It allows for a harmonic distribution of grayscales in accordance with the human perception, and detail in midtones and highlights. A detailed survey regarding the usability of different working spaces can be found at [www.LStar-RGB.com](http://www.LStar-RGB.com).

At these workstations and in imaging programs you should choose a midtone gray ( $R=G=B=153$ ) for a desktop background. This kind of gray equals  $L^*=60$  under an LStar calibration. This kind of lightness is best suited for checking the gray representation of your monitor, since color casts are more irritating in light and midtone grays than in dark tones.

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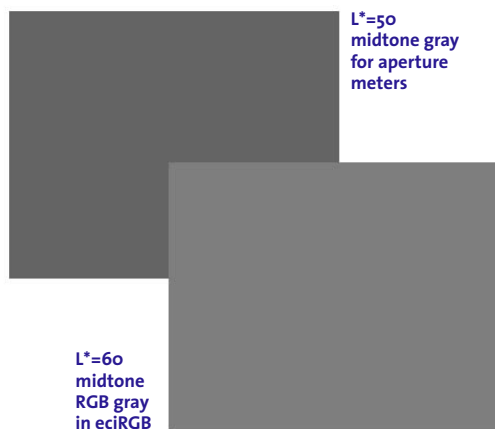


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## Gray Reference - Brightness

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These are the reasons why the *basICColor gray card* for use in digital photography and pre press has a remission factor of 25%. This equals a midtone gray of  $L^*=60$ . Gray cards made for conventional aperture metering (e.g. Kodak gray card) have a remission factor of 18% which equals a colorimetric midtone gray of  $L^*=50$ . This value is stored in aperture meters as a reference for object measurements. For conventional aperture meters, an exactly neutral grey without metameric failure is of minor importance.

If you should intend to use the *basICColor gray card* for conventional aperture meters, you need to apply a correction factor of 1/2 f-stop. In digital photography the color picker should show values of 125 to 130 (R=G=B) in eciRGB or 150 to 155 in LStar-RGB.





### Contrast in a Shot



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In addition to the neutrality and the aperture of a shot, contrast and highlight/shadow require special attention. Here lies the biggest advantage of RAW photography. In many photographic situations it is hard to find catchlights and shadows. In some situations you do not even have absolute black or absolute white (high key, low key). In these situations *basICCaliCube* comes to the rescue: The chrome ball reflects at least one of the light sources. The mirrorlike surface of the ball reflects nearly 100% of the light and thus represents the whitest part of the shot. In the black trap you find the darkest possible black. Light enters the hole in the *basICCaliCube* and is being absorbed by the black inside. The remission is nearly 0% and there is no color shift due to surface reflections. With highlight and shadow eye-droppers, you can define the dynamic range of the shot quickly and easily. Opposite to using real scene images you avoid a loss of definition in highlights and shadows. Gradation can then be adjusted easily on a calibrated monitor, using the 3 different faces of the *basICCaliCube*:

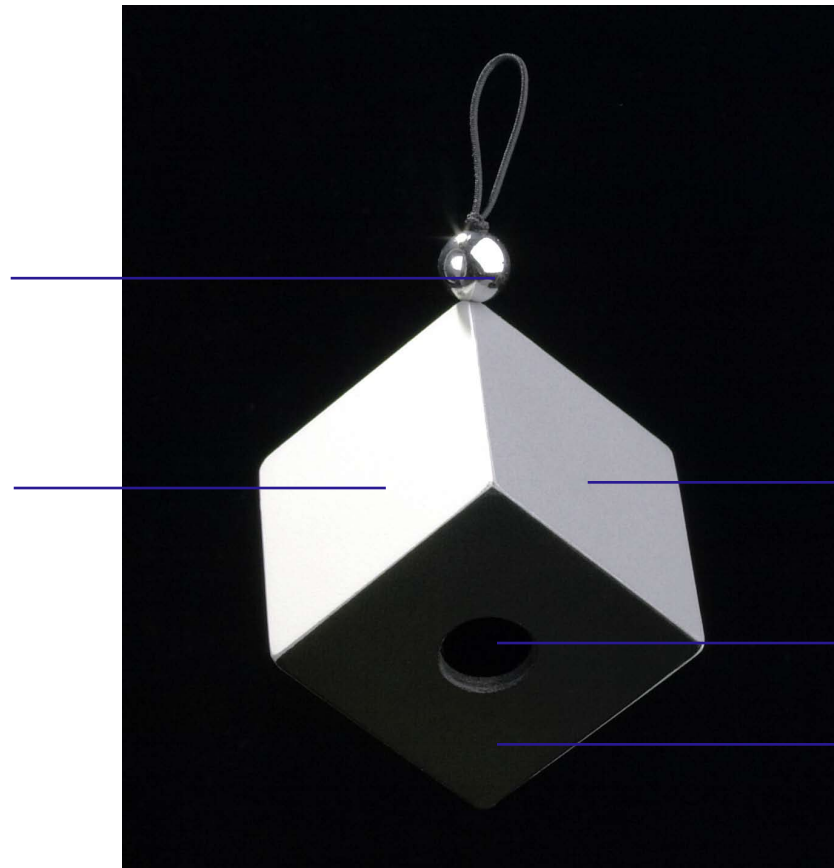
- White face: Definition in the highlights in relation to the catchlight (chrome ball)
- Black face: Definition in the shadows in relation to the black trap
- Gray: Brightness of the midtones



**Chrome ball:**  
1. Measure catchlight  
2. Set catchlight with color picker

**White face:**  
Shows definition in the highlight

**Attention:**  
Do not use for gray balance,  
use gray face!



**Gray Face:**  
1. Gray balance with color picker  
2. Reference for halftone gray

**Black trap:**  
1. Shows sensor noise  
2. Set black point with color picker

**Black Face:**  
Shows definition in the shadows

# conclusion



## Product Information

## basICCaliCube

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Penzberg, in January 2006

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## Contact

