basICColor *DeviL*

5

Reference Manual

Contents

Chapter 1

Preface

1. Preface

Why The Tasmanian Devil?
Do you know a more likeable devil than the Tasmanian Devil? When looking for a new icon for DeviL 5 you inevitably stumble across the Tasmanian Devil. It is an essential member of the Tasmanian ecology, where it is cleaning up the environment.

The basICColor DeviL is as indispensable in your color management environment where it also cleans up – it does away with prejudices about ICC color technology. With basICColor DeviL 5 you create DeviceLinks, the quality of which do in no way rank behind proprietary solutions. At the same time these DeviceLinks are compliant with the ISO standard. Thus: Sympathy for the DeviL!

1.1 Licensing

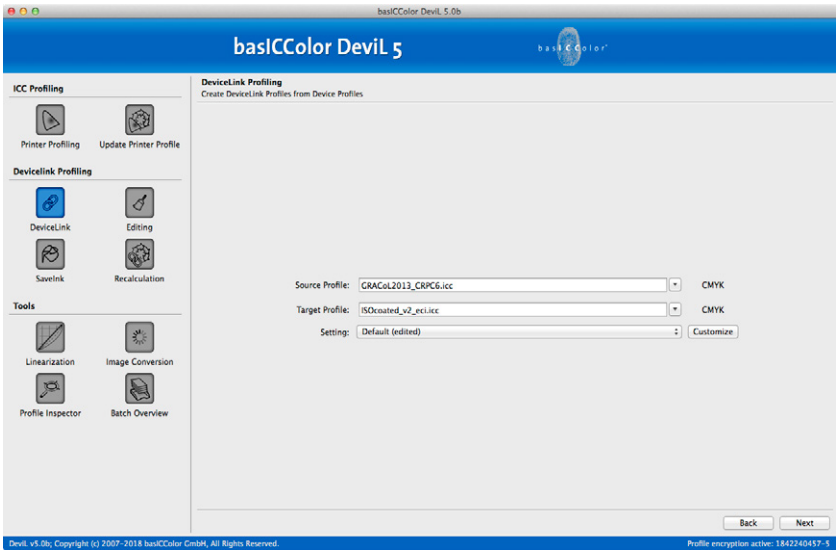
To license the application please refer to manual
basICColor Licensing:
https://www.basiccolor.de/assets/Manuals/Manual-Licensing.pdf

Chapter 2

Basic Funtions

2. Basic Functions

Start basICColor DeviL to get to the main window of the application. Each button on the left is for opening a separate module of basICColor DeviL.



The 10 basic functions of basICColor DeviL are:

- **Printer Profiling:** Create high-quality output profiles, adapted to the users needs.
- **Update Printer Profile:** Update existing printer profiles with just a few measurements.
- **DeviceLink:** Create DeviceLink profiles from ICC device profiles.
- **Editing:** Create customized DeviceLinks using edited test charts.
- **SaveInk:** Create SaveInk DeviceLink profiles and reduce ink consumption.
- **Recalculation:** Recalculate existing DeviceLink profiles with a new source or target profile.
- **Linearization**: Linearization of DeviceLink profiles.

- **Image Conversion**: Convert images using a variety of profiles.

- **Profile Inspector**: Manage and analyze all ICC profiles from one central location.

- **Batch Overview:** Monitor profile creation, create custom reports for individual profiles and create preview profiles at any time.

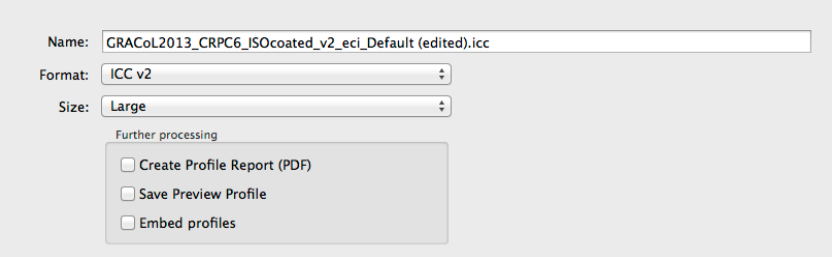
Enter each module by clicking on the respective icon. For detailed information on how to use each function please refer to the chapter of each module in this manual.

Chapter 3

Profile Settings

3. Profile Settings

The windows for profile creation settings are basically the same in Printer Profiling (incl. MultiColor), DeviceLink, Editing, SaveInk modules. Depending on the module, varying options may be available. Hereafter is a description of all available settings for profile creation in basICColor DeviL.



3.1 Name, Format and Size

Name: Type in a **Name** for the profile.

Format: Define the **Format** of your profile. An ICC format in accordance with specification v2 is recommended as basic setting however, the newer format ICC v4 can also be chosen. In this case, please ensure that your programs support this format correctly.

Note: *basICColor-products handle and use ICC v4 profiles consistently and correctly.*

Size: The setting **Large** is recommended. The size specifies the number of grid points in the profile and determines the amount of disk space required for the generated profile. **Small** profiles should only be used for test purposes. **Very Large** profiles can slow down further processing in subsequent programs. Additionally, some programs are not able to handle very large profiles.

3.2 Further processing

Create Profle Report (PDF): Recommended to activate. The PDF report provides an overview of the quality of the profile based on statistics, diagrams of gray balances, gradients and gamut representations as well as color separations of converted test files.

Calculate CMYK Profile: Only available when creating Multicolor printer profiles. Uses only the CMYK part of Multicolor data to create a CMYK profile. For example, this can be useful for Multicolor PDF files to enable the display of the CMYK part of a conversion in PDF viewers without Multicolor support.

Save Preview Profile: Is only available in Multicolor printer profiling. By activating this checkbox an ICC preview profile will be created in addition to the printer profile. It can be used as soft proof profile in Adobe Photoshop.

> ***Note**: Preview profiles are only suitable for proofing purposes. Either a preview profile or a CMYK profile can be created in one profiling step, but not both.*

Embed profiles: Physically incorporates the used source and target profiles into the DeviceLink. This function is tricky and only recommended if the DeviceLink has to be transferred to a computer which does not have the required source and target profiles. It was implemented mainly for use with certain RIPs which only accept DeviceLinks with embedded source and target profiles.

Save: Creates the printer profile and saves it in the folder Profiles (macOS) or Color (Windows),

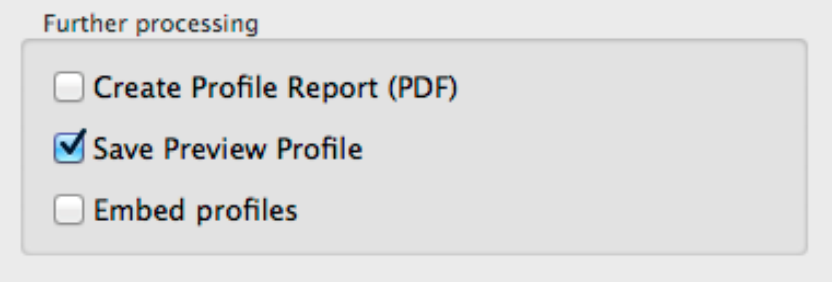
macOS:
/Users/Username/Library/ColorSync/Profiles

Windows:
C:\Windows\System32\spool\drivers\color

3.3 Preview Profiles

Introduction: Using Preview Profiles for Soft Proofs

Preview profiles allow soft proofing of image files in DeviceLink profiling and Multicolor printer profiling, without converting a file. Multicolor preview profiles provide a true color representation of images to be converted into the Multicolor color space in order to review the achievable result prior to the actual Multicolor conversion (More information can be found further down in the text). The same applies to DeviceLink conversions. Here, too, the DeviceLink preview profile can be used in Photoshop with the original data to visually review how the result of such a conversion would look like.



Preview profiles can be created together with DeviceLink or Multicolor printer profiles by activating the checkbox Save Preview Profile (see screenshots). Preview profiles have the suffix ‘preview‘ and are saved in the folder Profiles (macOS) or color (Windows), (macOS: /Users/Username/Library/ColorSync/Profiles, Windows: C:\Windows\System32\spool\drivers\color). Right clicking on the preview profile and selecting the menu entry Show file in the context menu will take you directly to the location of the selected profile.

A preview profile is a printer profile with the same color space as the source profile of the DeviceLink. It can be used as soft proof profile, for example in Adobe Photoshop. Preview profiles can be created for the following DeviceLink combinations:
RGB-to-CMYK, CMYK-to-CMYK, RGB-to-Multicolor and CMYK-to-Multicolor

***Note**: The creation of preview profiles is not available for DeviceLink profiles using more than four channels in the source color space since only preview profiles of the color spaces Gray, RGB or CMYK can be used in Photoshop. Multicolor printer profiles are not affected as their preview profiles are always RGB profiles which can be used in Photoshop.*

> ***Example**: To adapt your RGB image data in RGB mode to the desired CMYK printing condition, use the preview profile of your RGB-to-CMYK DeviceLink as soft proof profile in Adobe Photoshop to check how the image would look like after the conversion. This allows specific RGB adjustments without the need to convert the RGB file early on. A preview profile is a very useful feature, particularly in view of storing RGB image data in media-neutral workflows.*

Preview profiles can also be created for Multicolor printer profiles which allows a true color simulation of the color representation prior to application of the Multicolor profile. Although Adobe Photoshop CS4 or higher is able to convert image data using Multicolor profiles, the display of multichannel files is not a true color representation in Photoshop. So far, a true color representation of multichannel files is only possible using additional plug-ins and causes an increased workload. The preview profile function generates an RGB printer profile which features the same color visualization as the original Multicolor profile. Use this preview profile on an original image data for soft proofing.

***Note**: Preview profiles are only intended for soft proofs and should never be used for the actual conversion. A preview profile provides an excellent visual preview of the expected result of a DeviceLink conversion. However, the special features of the DeviceLink, such as preserving color purity, cannot be 100% emulated.*

3.3.1 Using Preview Profiles for DeviceLinks in Adobe Photoshop

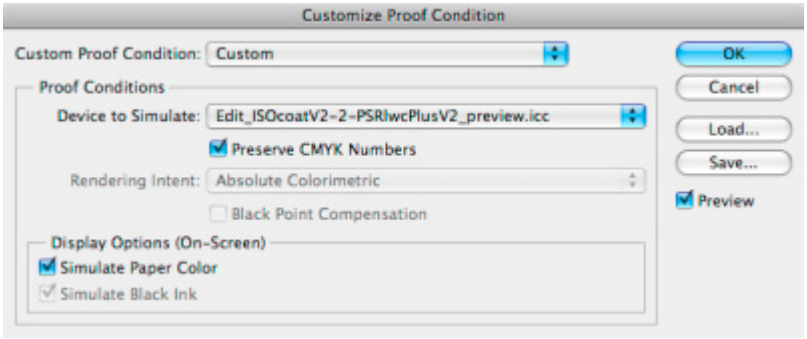
1. Open the original image data to be converted using a DeviceLink profile in Adobe Photoshop.

2. Either assign the **Preview profile** from DeviL to this image file, or select the **Preview profile** in the dialog ***Customize Proof Condition*** as ***Device to Simulate*** (see screenshot).

***Note**: The color space of the preview profile is based on the color space of the DeviceLink's source profile. It is an RGB preview profile for RGB-to-CMYK DeviceLinks and a CMYK preview profile for CMYK-to-CMYK DeviceLinks.*

3. Click **Preserve CMYK Numbers** to get a virtually exact preview of the expected color representation for the DeviceLink conversion.

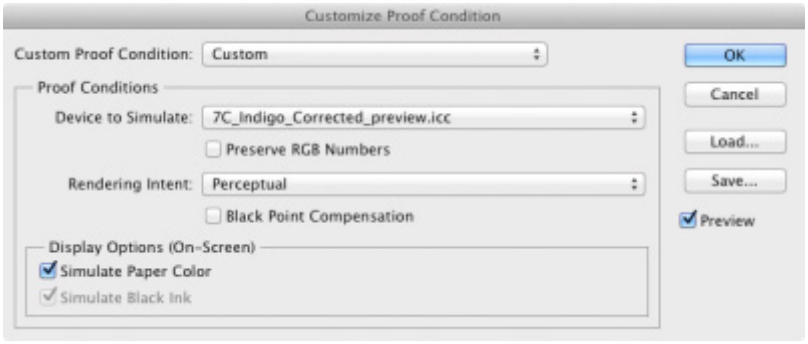
***Note**: Pipette values do not correspond to the final DeviceLink conversion. Only the color representation in the soft proof does.*



3.3.2 Using Multicolor Preview Profiles in Photoshop

1. Open the original image data to be converted using a Multicolor printer profile in Adobe Photoshop (for example an RGB image)..

2. Select the **Preview profile** from DeviL in the dialog ***Customize Proof Condition*** as ***Device to Simulate***. Find the profile in the list of RGB profiles. The naming is based on the Multicolor profile name: Profile name_preview.icc

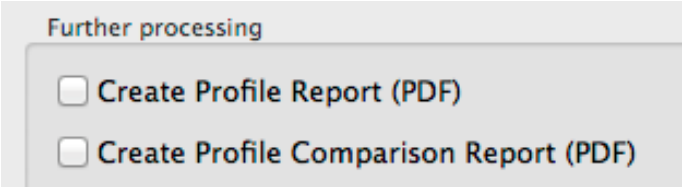


3. Select the desired ***Rendering Intent*** and disable the checkbox ***Preserve RGB/CMYK Numbers.***

Note*: Eyedropper values do not correspond to the final DeviceLink conversion. This is only for a soft proof..*

3.4 Create Profile Report (PDF)

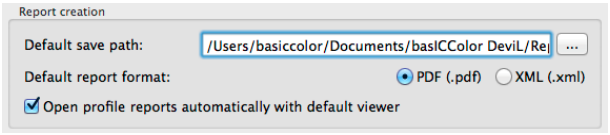
Profile reports can be created for Printer or DeviceLink profiles. To do so, activate the checkbox Create Profile Report in the last step of the profiling or, when updating profiles, the checkbox Create Profile Comparison Report.



Depending on the type of profile the report contains various statistical data, such as statistics about profile precision (**Integrity, Precision, Black Point, White Point** etc.), graphic representations of curves and gamuts (**Gray Balance, Gradients** etc.), conversions of test images, separations and color patches to evaluate the smoothness or the purity of colors. All this facilitates the detection of artifacts that may be present.

Profile reports can be created at any time in **Batch Overview** or in **Profile Manager** which, by the way, is not restricted to basICColor profiles.

Under Preferences specify whether to create a PDF report with sample images or an XML report with pure data.



***Note**: If a profile comparison report is created when updating a profile, the measurement data obtained from the update test chart will be compared to the data of the original profile (reference profile).*

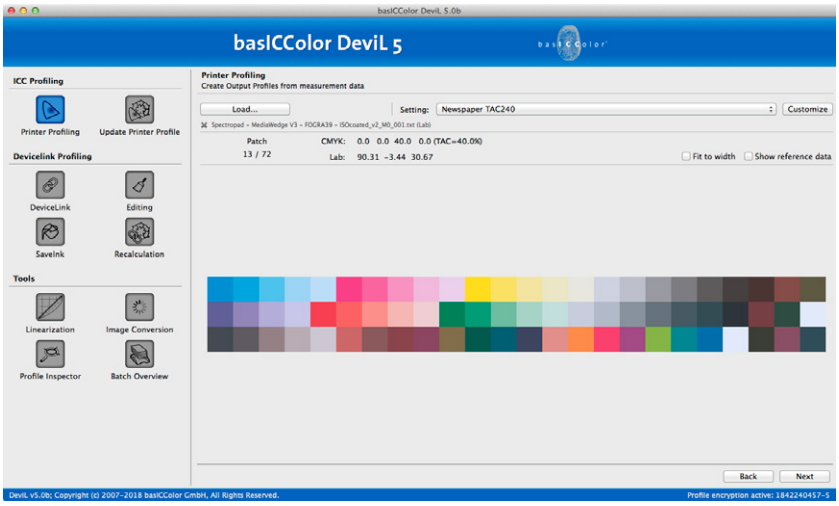
If the checkboxes **Brightener Compensation** or **Measurement Correction** have been activated, the data of the original profile will not be compared to the measurement data from the update test chart but to the data modified by these options.

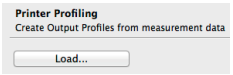
Chapter 4

Printer-Profiling

4. Printer Profiling

The module **Printer Profiling** is a powerful tool to create target profiles meeting the ICC standard.
Next to generating RGB and CMYK target profiles, another main task of this module is to build MultiColor profiles.
MultiColor means that a printing system works with more than 4 colors. The maximum number of color channels supported by bas**ICC**olor *DeviL* is 7 primary colors.



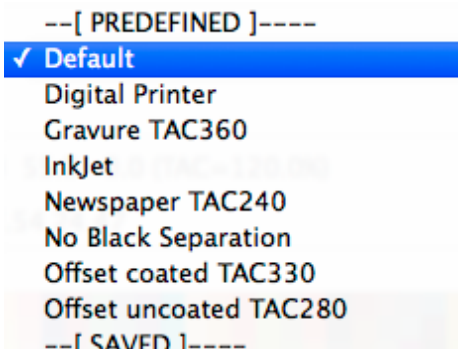


Load: Opens and displays existing measurement data files. Alternatively, drag and drop the data into the Printer Profiling window to extract and view the data. DeviL supports a variety of device manufacturer formats.
Measurement and reference data can be processed three different ways:

- Use reference data provided by organizations such as FOGRA, ECI or IDEAlliance.
- Use data from a profile. Many manufacturers of profiling software save the measurement and reference files used for profiling within an ICC profile. Simply drag and drop the ICC profile to the **Printer Profiling** window and the data will be extracted and displayed. Alternatively, the profile can be opened and extracted using the button **Load**. If an error message pops up, the ICC profile does not contain measurement data.
- Measure test charts using ***basICColor catch*** or measuring tools from other instrument manufacturers, save the data and open in *DeviL*.

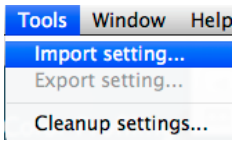
4.1 Setting

Profile settings for Printer, DeviceLink and SaveInk profiling can be selected in the drop-down menu Setting. Select the applied printing method. DeviL contains a large number of standard settings for common printing methods (e.g. digital and inkjet printing).
To adjust these profile parameters, select **Customize**.



Custom settings can be saved, imported and exported which provides the ability to exchange personal profiling settings easily with other DeviL users or make them available for support purposes.

There is a „Default“ setting for all primary color systems, which usually provides excellent profiling results without any further adjustment.



Import setting: Settings can either be imported as configuration file via the **Tools** menu using the entry Import setting or by dragging an ICC profile with the desired settings on the drop-down menu **Setting**. The name of imported profiles receives the suffix (imported). If an inappropriate profile (for example an RGB profile for CMYK profiling) is dragged on the drop-down menu Setting, an error message appears.

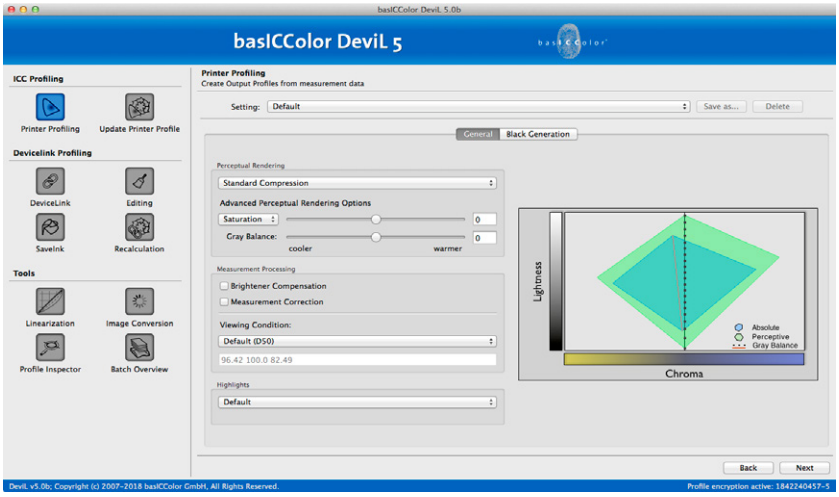
Export setting: Customized profile settings can be selected in the drop-down menu **Setting** and exported as configuration file by using the entry **Export setting** from the **Tools** menu.

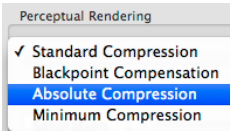
However, DeviL's default settings cannot be exported. Standard settings are listed in the drop-down menu **Setting** under the entry [PREDEFINED] and can be customized, but they cannot be overwritten. After customizing any setting the name receives the suffix (edited). It is now a custom setting which is listed under the entry [EDITED] and thus can be exported. Edited settings can be saved under any name. Saved settings will be removed from [EDITED] and listed under [SAVED]. Saved and edited settings can be deleted manually.

Cleanup settings: All settings found under the entry [EDITED] will be deleted.

4.1.1 General

Select your general settings for the profile generation in the tab **<General>**.





Perceptual Rendering

Depending on the task at hand, it can make sense to use different versions of gamut mapping. For printer profiling, we therefore offer four different methods in relation to the perception-oriented rendering method under „Perceptual Rendering“:

- **Standard Compression:** Standard method, which is suitable for most applications. Neutral tones are converted by the relative colorimetric method. If the paper white of the printing medium used is significantly more yellow than the reference, the gray axis also looks more yellow in accordance with the paper white.

- **Blackpoint Compensation:** This method largely corresponds to the Relative colorimetric with black point compensation method familiar from Adobe products. When converting CMYK data in printing systems, the image definition in the highlights and shadows is preserved, but losses of definition in areas of highly saturated color are avoided. Neutral tones are converted by the relative colorimetric method.

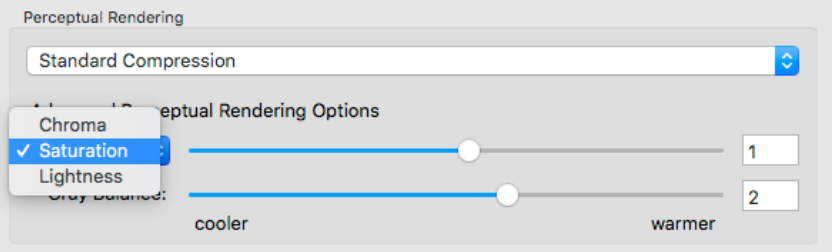
- **Absolute Compression:** This method is geared to the absolute colorimetric intent, the contrast range in the highlights and shadows being adapted to avoid any loss of image definition. The rendering of neutral colors likewise corresponds to absolute colorimetric rendering, there being no paper color simulation in the highlights.

- **Minimal Compression:** This rendering intent allows an absolute colorimetric reproduction and compensates only close to the black and white point. This means you will reach the maximum black point and will not simulate white. You may use this rendering intent if you like to achieve a very close reproduction of a print standard, e.g. ISO Coated V2 or GRACoL2006 Coated1v2 on a digital printer. If you like to use a printer profile generated with a special basICColor rendering intent in another ICC-compliant software, simply chose perceptive rendering intent.

***Note**: Similar to the absolute colorimetric rendering intent, you should ensure that the target color space is larger or at least the same size to avoid any loss of structure and details. For color conversions from large to small color spaces, please use <Absolute Compression> instead if you want to maintain the gray balance of the source color space.*

With these methods you influence the whole color space rendering and you can individually adjust the rendering intent to your needs.

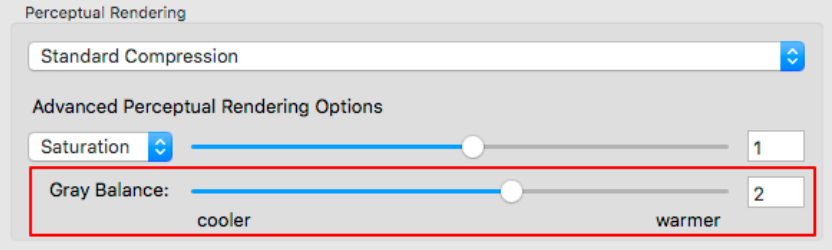
Advanced Perceptual Rendering Options: The drop down menu allows changes to the overall **Chroma, Lightness** or **Saturation** of the profile using a slider. **Chroma** can be used to reduce or increase the chroma of highly saturated colors in the range between -20 and +20. **Saturation** can be used when highly saturated colors are required. As with the setting **Chroma**, the gray balance is not affected when moving the slider. **Saturation** can be used especially for large color spaces such as gamut extending Multicolor in order to achieve more brilliant colors.



***Note**: basICColor intentionally keeps the chroma effect moderate. However, when increasing the chroma, ensure that the setting neither causes a loss of image definition in highly saturated colors, nor adversely affects colors such as skin tones.*

The effect of each of these settings is shown in the gamut graph on the right. Increasing the saturation results in higher chroma and lower lightness, so more saturation will slightly darken the colors and they will appear more vibrant. In contrast, more chroma can result in high chroma colors being out-of-gamut and these colors would not be rendered by the given profile.

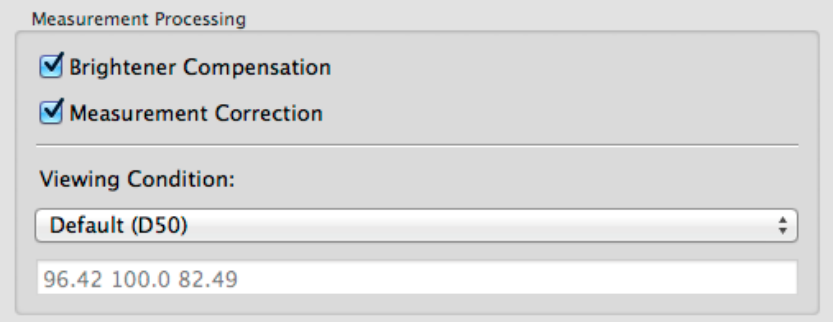
Gray Balance: Allows adjustment of the gray balance to create a cooler or warmer gray axis. cooler shifts the gray balance towards more bluish colors (negative b* values), warmer shifts it towards yellowish colors (positive b* values). The effect of the slider setting is visualized in the graphic..



Note: *The setting Gray Balance works independently from the selected Perceptual Rendering method and allows visual adjustments based on personal color preferences.*

4.1.2 Measurement Processing

When creating or updating printer profiles it may be necessary to optimize the measurement data. The **Measurement Processing** in DeviL includes the optical **Brightener Compensation**, the **Measurement Correction** and the specification of a **Viewing Condition**.



Brightener Compensation:
Recommended for bright white papers that contain optical brighteners. This correction weakens the effect of optical brighteners, which are evaluated differently by a measuring device compared to the human eye, and prevents negative accompanying effects such as a yellowish color reproduction.

> *Recommendation:*
> *Work with spectral measurement data whenever possible. When working with spectral measurement data, the function Brightener Compensation can achieve an optimum correction. The correction will only be executed,in contrast to colorimetric measurement data (Lab measurement data), if DeviL recognizes the paper color as an optical brightener. However, it will not be carried out if DeviL does not recognize the paper color as optical brightener, which, for example, is true for a blue-colored paper.*

As a result of the viewing condition changes according to ISO 3664:2009, The updated standard makes it easier to spot the effects of optical brighteners (OBAs). So a minor correction is needed for devices using the M0 measuring method.

*Note: To specifically correct the effects of optical brighteners, use basICColor ImProve's **Brightener tool** before profile creation in DeviL and disable the corresponding checkbox in DeviL to avoid double compensation.*

Measurement Correction:
Identifies and resolves measurement errors without changing the printing behavior. Redundant measurement values, which occur in typical test charts such as ECI2002 or IT8.7/4, are taken into consideration for detecting consistent printing properties and will be intelligently included in the correction. Further corrections, like the removal of redundant measurement values or Smoothing, can be done in the separate measurement data processing program basICColor IMProve

Recommendation: For your own measurement data select Measurement Correction as the default setting. However, this correction should be disabled for measurement values that have already been smoothed (such as FOGRA measurement values) or for measurement values that have already been processed with basICColor IMProve.

Viewing Condition:
Typically, printer profiles are optimized for D50 viewing conditions, however, for different tasks, e.g. photos in a gallery under incandescent light (roughly corresponds to viewing condition A) or presentation displays under a trade fair lighting with suboptimal lighting conditions (e.g. fluorescent light), the lighting conditions can be taken into account when creating the profile.
To do so, select one of the three predefined viewing conditions or manually enter the measured viewing condition as Kelvin value or as XYZ value.

Alternatively, simply drag and drop a measurement file (TXT or CSV file) of the measured light onto the value field. DeviL extracts the white point from the file and displays the value. DeviL then uses this information to calculate a printer profile that makes your prints (with the selected viewing condition) appear in the same way as they would under the standard D50 viewing condition

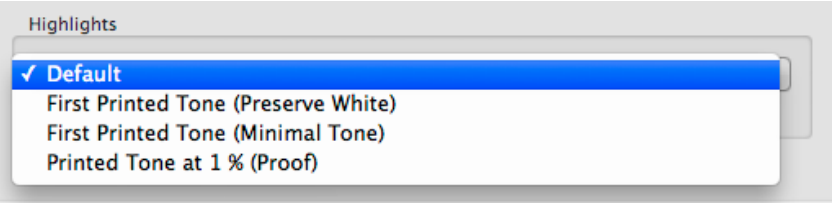
When using spectral measurement data of a test chart and a spectral light measurement of a viewing condition, DeviL will use a spectral color model rather than the usual chromatic adaptation according to CIECAM02.

Chromatic adaptation according to CIECAM02 will only be used if spectral light measurements is not provided as viewing condition and/or if the test chart does not contain spectral measurement values. To select a spectral light measurement select the entry **Emission** in the drop-down menu **Viewing Condition** and then select your measurement data file in the subsequent dialog or just drag and drop your measurement data file onto the drop-down menu.

***Note**: DeviL remembers the last used settings including the selected **Viewing Condition.** When creating new profiles, please check whether the selected viewing condition is in accordance with the purpose of the profile. If no specific viewing condition is required, always select the default **D50**.*

4.1.3 Highlights

In flexo printing, the first printed tone is often subject to a rather high tone value increase. Additionally, in some flexo printing processes there is no transfer of tone values below a certain percentage in the highlight areas. However, the simulation of those process properties is particularly important for proofing applications to truly simulate the final print result in the highlights. It may also be necessary to increase the tone values in the highlights when using the profile for production or separation. For that reason, we integrated four different settings in DeviL to adjust the Highlights.



- **Default**: Results in ‚normal' profiling behavior in highlight areas. Use this setting for all printing processes that don't require any adjustment of the first printed tone.

- **First Printed Tone (Preserve White):** Defines when the first printed tone of the profile will be considered and appear in the proof (hard copy or soft proof). When the profile is used for separation, the paper white is maintained and small tonal values are immediately increased to the set tonal value resulting in a strong slope.

- **First Printed Tone (Minimal Tone):** Defines when the first printed tone of the profile will be considered and appear in the proof (hard copy or soft proof). When the profile is used for separation, a tonal value corresponding to the set percentage is already printed in the white of all channels.

- **Printed Tone at 1 % (Proof):** This setting defines the tone value to be achieved at 1% in proof direction of the profile. In separation direction of the profile, the setting Default is used (in contrast to other highlight settings).

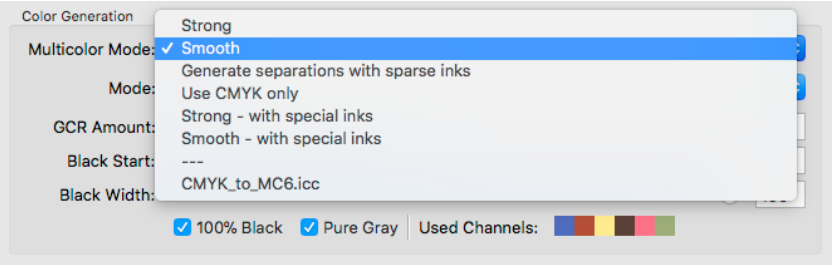
- **Based on data:** If the loaded measurement data contains enough data points in the highlights, DeviL also provides information about the start of the first printed tone (see screenshot). This information may be used as a guide to assess the value that should be entered in the input field to the right.

Note: The information Based on data will only be displayed when one of the Highlight settings is selected from the drop-down menu and the data allows a different recognition of the first printed tone compared to the Default setting. Before using the value for profiling, we suggest analyzing the data in basICColor IMProve

4.1.4 Black Generation

Multicolor Mode: Determines how colors will be built up in individual separations. Is only available when Multicolor measurement data has been loaded.

Note: *A Multicolor license is required to use Multicolor features.*



In DeviL, the first three channels represent primary colors (usually CMY). They should form a sound color space (gamut) and should also be able to create a gray axis. The fourth channel should be black if a separation with UCR/GCR is desired. If black is absent in the Multicolor measurement data while automatic Black Calculation is selected, it will be recognized by DeviL and the separation will not be generated. **Black separation** is disabled if the value for **Max. Black** in the **Black Point** and **TAC** setting is 0%. Additional spot color channels (e.g. Orange, Green or Violet in a CMYK-OGV 7 color data set) are regarded as color space expanding colors. The **Multicolor Mode** determines how color space expanding colors are factored in together with primary colors.

- **Strong:** As much spot color as possible will be applied. Accordingly, less primaries will be used in the highly saturated color areas. This results in a greater use of color space expanding spot colors and therefore in highly saturated colors in the printout.

- **Smooth:** Is the default setting and should remain unchanged if a particularly smooth and harmonious separation with saturated colors is required.

Note: The two Multicolor modes Smooth and Strong are similar but Smooth uses less color space expanding spot color channels.

- **Smooth - with special colors** and **Strong - with special colors:** These two Multicolor modes are designed for applications in industrial printing, such as ceramic printing, in which the main colors are supplemented by additional light (e.g. Pink) or dark (e.g. Brown) color space expanding colors. They are an enhancement of the existing Multicolor modes Smooth and Strong, however, they also use additional colors that are not commonly used. For example, the additional color pink is used with a darker magenta in magenta gradations. Here, pink is used in light areas while magenta is used in dark areas.

***Notes**:*
1. The gray balance of the two Multicolor modes shows additional channels as bright or dark colors are incorporated into the gradations and gray balance curves.
2. These two Multicolor modes also support light inks in profiling, such as light and dark magenta. In principle, light and dark colors should be processed in the printer or RIP (Raster Image Processor). If they are not pre-processed from the RIP they require particularly large test charts for profiling.
3. It is also possible to combine light gray with black which in some printing processes like Flexo printing can mask noticeable artifacts in the highlights. However, appropriate test charts have to be used.

- **Generate separations with sparse inks:** Is of interest for the packaging market as color separations are created in such a way that a certain hue uses as much as possible of a related spot color and very little or no primary colors. For example, in order to create a red hue as much as possible of a reddish spot color is used but very little to no magenta or yellow. A maximum of two or three colors are used for each color segment and, therefore, this Multicolor mode is practical to save process colors. However, black generation cannot be controlled and is based on the (separation) mode MaxK

.

***Note**: In contrast to the Multicolor modes Smooth, Strong and Use CMYK only, the Multicolor mode Generate separations with sparse inks does not allow regulation of the Black Generation. Accordingly, these settings are grayed out.*

- Use CMYK only: Selecting this method results in a Multicolor printer profile that creates the desired number of channels (e.g. 7 channels) but is only composed of CMYK. The color space expanding spot color channels are not used for the separation but are used for the simulation of colors.

Notes:
1. In package printing, there is sometimes a request for images and vectors composed of CMYK to be generated with only minimal changes to CMYK values and without spot colors - despite conversion into a Multicolor space. In this case, only spot colors, like Pantone colors, which are present as DeviceN in the PDF should be converted into the large Multicolor space. Such a workflow is possible in two easy steps: (1) Creation of a separation-preserving CMYK-to-Multicolor DeviceLink profile in DeviL using the Multicolor method Use CMYK only. (2) Spot color conversion of the PDF using the color server ZePrA.
2. In DeviL all settings of Color Generation (i.e. the entire tab) depend on black being present in the measurement data. Therefore, black must be present in the measurement data or ICC profiles as fourth channel.

If black is not present in the measurement data as the fourth channel, this channel will be treated as if it were the black channel. As an example, if blue is present as the fourth channel, then all settings in the tab Color Generation will still treat the fourth - now blue - channel as a black channel. In this situation, spot colors can be used for the calculation of the gray balance and the black point, which may not be desirable. Mode: Defines the method for the generation of black in the target color space and therefore influences the separation comprehensively.
The following modes are available in the drop-down menu:

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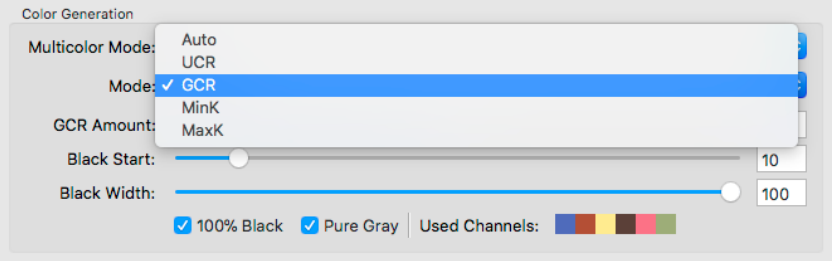
The following modes are available in the drop-down menu:



- **Auto:** Uses a medium GCR amount which is based on the measurement data.

- **UCR:** Allows adjustment of the settings Black Start and Black Width.

- **GCR:** Additionally allows the adjustment of the setting GCR Amount.

- **MinK:** Uses only a minimal amount of black and generates a separation using the maximum amount of CMY.

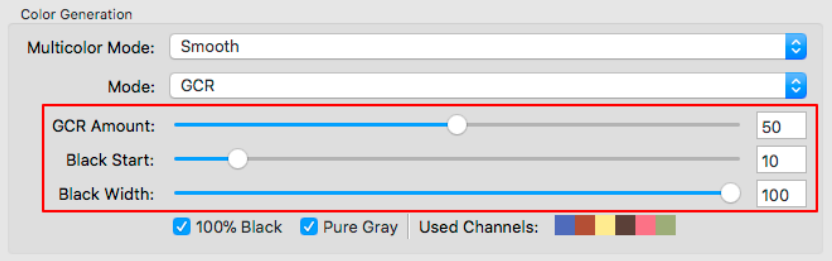
- **MaxK:** Uses a maximal amount of black and generates a separation using the minimum amount of CMY.

The methods **UCR, GCR, MinK** and **MaxK** generate a new separation, regardless of the separation of the target profile.

GCR Amount: Defines the amount of CMY that is replaced by black. At 0 only a low GCR amount is used which mainly impacts the shadows whereas at 100 a very strong GCR is used which effects the shadows and the highlights.

Black Start: Defines the starting point for the black generation. Black will be used if the minimum amount of CMY exceeds this limit.

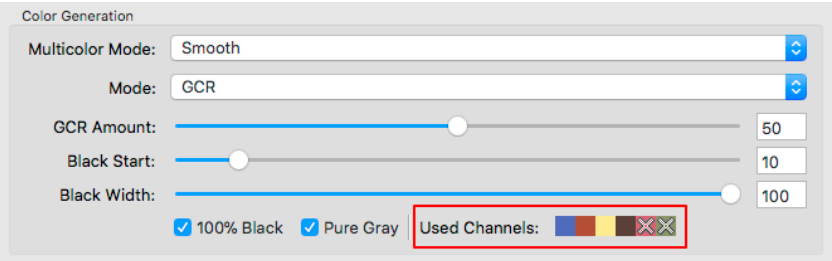
Black Width: Defines the range in which black is generated outside the color-neutral area. The lower the value, the less black will be generated outside the color-neutral area.



100% Black: Prevents a pure black RGB text from being printed in four colors after conversion into a CMYK profile which would result in a blurred looking text. This is often the case with Office documents. Enabling **100% Black** converts an RGB value of 0-0-0 to CMYK 0-0-0-100 (i.e. 100% black).

Pure Gray: Enabling this checkbox in a CMYK printer profile results in a gray balance which is composed of black ink only. However, this only makes sense if the printing system features a very neutral black from shadows to highlights.
Enabling **Pure Gray** in an RGB printer profile results in a gray balance which is composed of equal amounts of RGB values. This proves to be useful in RGB controlled (inkjet) print drivers.

Used Channels: Defines the channels to be used in a profile and offers a quick and easy way to select or exclude channels when separating data. The effect of selecting or excluding colors on **Curves** and the **Gamut** is immediately visualized in the graphic and the **Black Point** value.
By default all colors of the profile are enabled. To exclude a color click on the appropriate colored box. Multiple colors can be excluded. Excluded colors will be grayed out and marked with an X. To enable an excluded color simply click on it again.

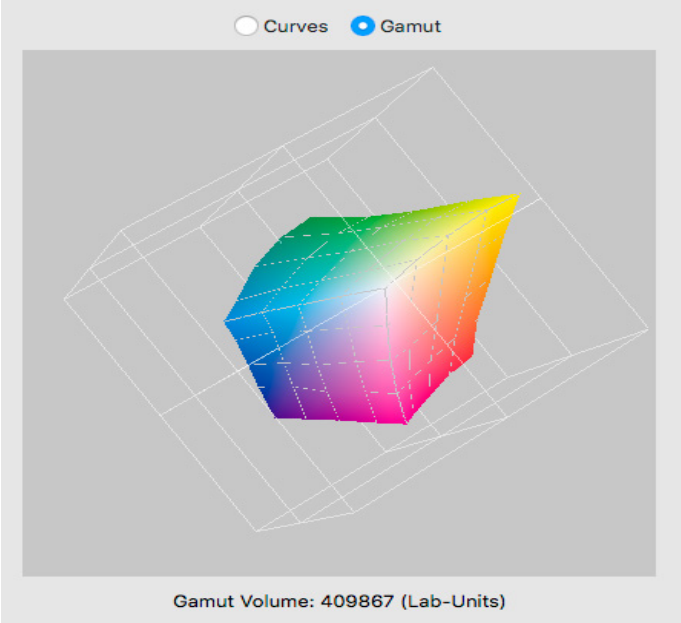


***Note**: This function is particularly intelligent for Multicolor profiles, as it searches for replacement colors in the Multicolor channels when excluding a channel (e.g. Cyan), which can compensate for the missing channel in the gray balance.*

The alternatively calculated Multicolor channels are displayed grayed out in the panel Black Point and TAC (further information can be found in the toggle Black Point and TAC).

***Example**: If a brown chocolate artwork is intended to be printed in CMYK without using any Cyan in the separation, a CMYK printer profile can be created which only uses MYK. These types of profiles avoid unwanted Cyan dots in the separation and the converted artwork would appear visually close to a conversion with a complete CMYK profile. Obviously such a profile should not be used if the artwork contains Cyan based color combinations, such as cyan tones and blue or violet colors.*

Curves and **Gamut**: Visualize the effects of the selected color separation and **Black Point** settings. The Gamut view shows changes of the gamut shape immediately when altering settings and provides a real time preview of the loaded measurement data. In addition, the **Gamut Volume** is calculated and expressed in Lab units allowing to find the settings that produce the largest gamut (highest number) easily.

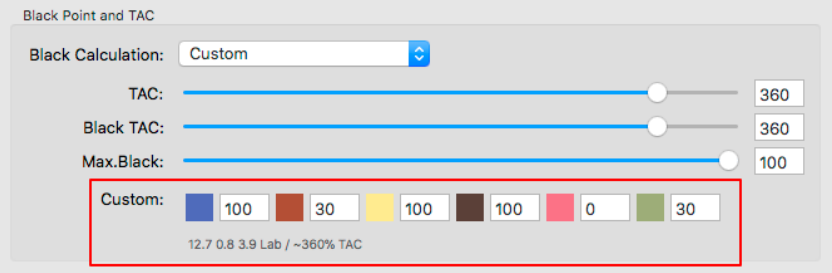


***Example**: The gamut view allows to observe how a low **Black Width** setting or a very late **Black Start** reduces the ability of a profile to render dark colors.*

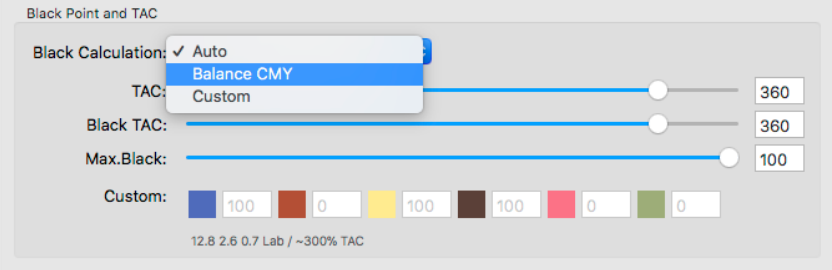
Black Point and TAC

Under Black Point and TAC the overall Total Area Coverage (TAC) and the TAC for the black point (Black TAC) can be defined. The black TAC represents the darkest color value of the profile which is usually identical with the maximum TAC.

The graphical display of each color contains a number field showing the amount of ink used in the profile. Depending on the selected **Black Calculation** the number fields are either enabled or disabled.



Black Calculation: Three different settings are available (see screenshot below).



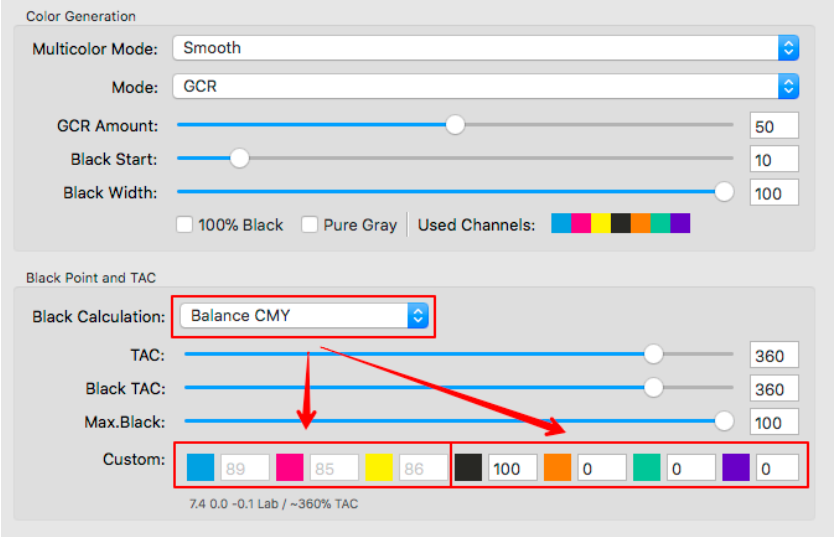
- **Auto:** The calculation of the optimal black point (dark and neutral) is based on the measurement data. The values entered for Black TAC and Max.Black define limits which must not be exceeded, but may be lower if technically possible.

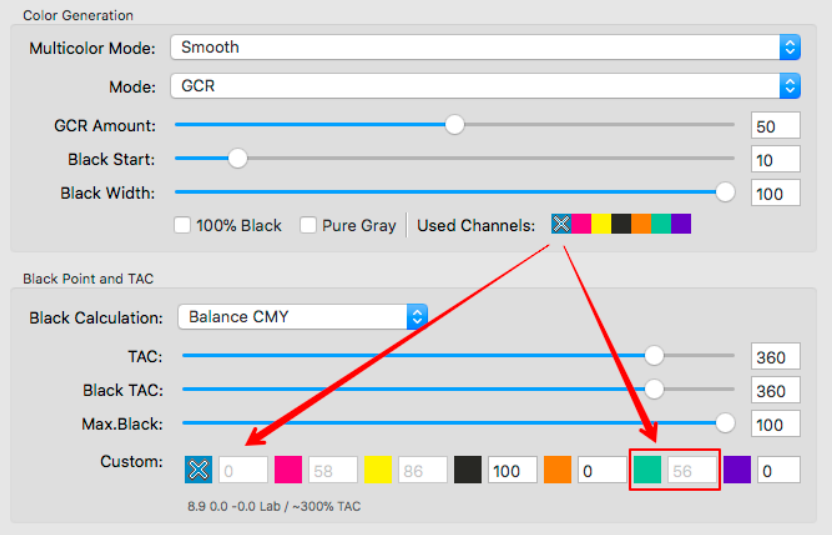
  All channels are used to generate the black point (Black TAC), therefore individual channel editing is disabled. This mode will not use any Multicolor channels beside the first four channels (usually CMYK).

***Note**: If you do not have a default value for the Black TAC it is recommend to use 400% for the Black TAC as a starting point for the calculation.*

- **Balance CMY:** This setting adapts the CMY values to a pre-defined Max.Black value and generates a neutral black point. Define the Black TAC and TAC in accordance with the printing conditions. Max.Black should be set to the ideal value for the selected substrate. Similar to the setting Auto those values are regarded as maximum values which may be underrun if a neutral black point is not achievable.
  Allows customization of the black channel (or in general the 4th channel) and the addition of Multicolor channels. Entered Multicolor color values are fixed - like the Max.Black value - and CMY values will be adjusted accordingly.

Note on excluding channels:
Basically Balance CMY allows editing of the black channel (or in general the fourth channel) and the Multicolor channels. The CMY channels are grayed out (see screenshot).

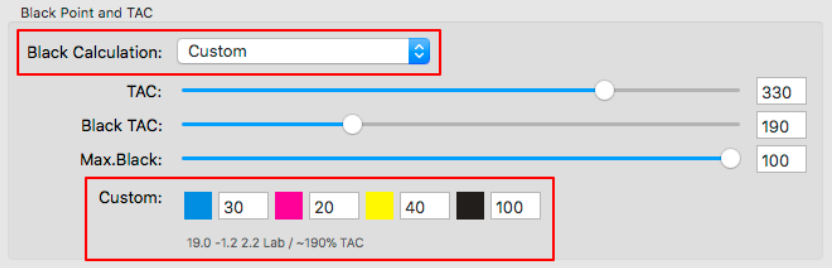




- Custom: Allows definition of the black point in the input boxes. The Black TAC value will then be recalculated. Allows editing of all channels.

Notes:
DeviL calculates the Lab values based on the entered custom values. When changing custom values the resulting effects can be seen immediately. If you prefer DeviL's recommendations select the settings ***Balance CMY*** *or* ***Auto****.*

For Multicolor profiles with more than four channels you can use the extra Multicolor channels for the black generation besides the first four channels (typically CMYK). However, the total area coverage (TAC) cannot exceed 400%. Values for the Multicolor channels can be entered manually when using the settings **Balance CMY** *or* **Auto** *and these values will then be used to calculate the* ***Black TAC.*** *Usually it is not necessary to use those channels but sometimes a dark Multicolor channel adds desired contrast and definition. This can easily be checked by viewing the Lab values below the* ***Custom*** *fields. If the addition of a certain Multicolor channel decreases* ***L**** *while a*b** *values are not significantly altered, using this channel can be considered.*
However, the gray balance will use additional channels as well.

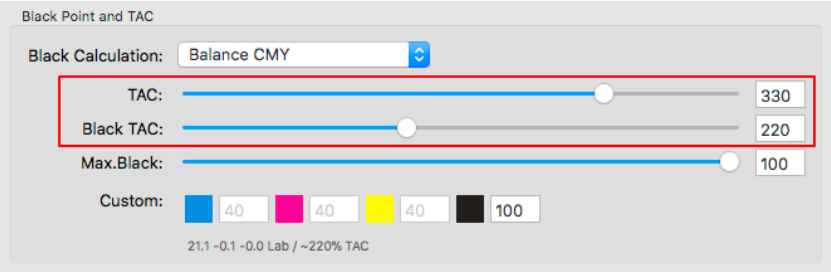


With the settings **Auto** or **Balance CMY** DeviL tries to use neutral **a*** and **b*** values for the **Black Calculation.** In contrast, selecting the setting **Custom** allows generation of a black point without neutral **a*** and**b*** values. Keep in mind that this can lead to a colored black point, which you can recognize by the **a*** and **b***values.
TAC and **Black TAC**: The value for the maximum total area coverage can be entered in the input box **TAC** (value range: 0 to 400%). This value must not be exceeded. This also applies to multicolor profiles.

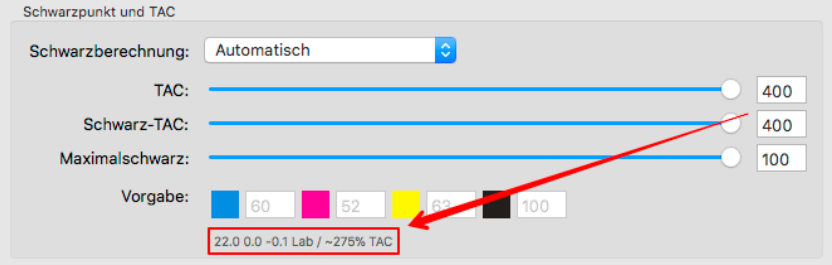
> ***Note**: The sliders limit each other, so the* **TAC** *can never be lower than the* **TAC** *(but it can be higher).*

Max.Black: The maximum amount of black ink to be used (given by the separation) can be entered in the box **Max.Black** (range: 0 to 100%).

The Total Area Coverage (**TAC**) and the TAC for the black point (**Black TAC**) can be defined by **Black Point and TAC**. The **Black TAC** represents the darkest color value of the profile which is usually identical to the maximum TAC.
Many modern printing systems allow a black point that is generated by using a low amount of ink. Sometimes the darkest color (**Black TAC**) can be printed using pure black which means that in extreme cases a black point of 100% K may be sufficient. Obviously, such a low **TAC** does not work for other color areas – it would not even be possible to print a true red, green or blue! Therefore we separated the **Black TAC** from the general **TAC**. This allows using the best setting for **Black Calculation** without restricting the color space



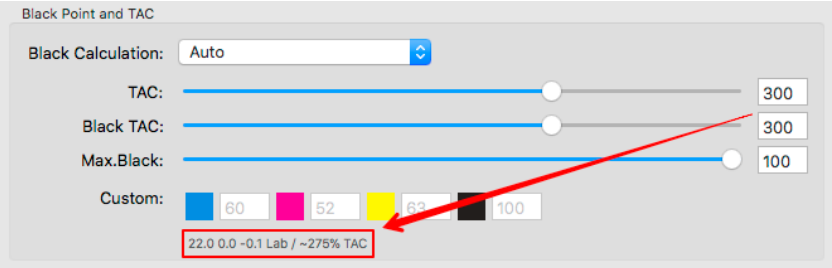
The value for the black point (**Black TAC**), which results from your settings, will be displayed after a short calculation time below the text box **Custom** (outlined in red in the screenshot on next page).



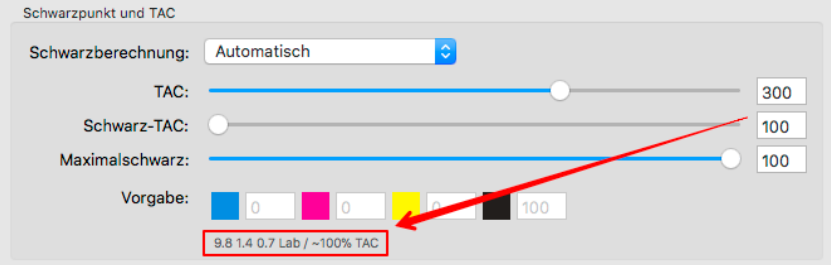
The Lab value is particularly handy for assessing the effect on the black point when changing the TAC or Black TAC. The smaller the L* value, the deeper the black and the higher the contrast.

TAC and Black TAC can be adjusted separately in DeviL
The total area coverage (TAC) - defined by the separation - and the Black TAC are identical in traditional printing systems. However, industrial printing applications and many digital printing systems show that the black point can be selected much lower than the total area coverage. To achieve a sound gray balance with a high contrast while maintaining highly saturated colors it is necessary to separate these two settings.

Advantages of a separate **Black TAC**
We would like to demonstrate how important it is to adjust the **Black TAC** independently from the total area coverage (**TAC**) using a digital printing system. Let's assume the **Black TAC** and **TAC** could not be set separately and we had to use identical values for both of them. If you selected the setting Auto to calculate the black point and set a **TAC** of 300% (and therefore a **Black TAC** of 300% as well), DeviL would calculate the best black point for this case. The result would be a total area coverage of 275% with a neutral black point (a* and b* are 0 respectively), but with a very light L* of 22.0 (outlined in red in the screenshot).



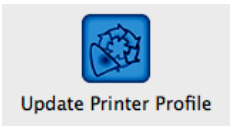
DeviL allows the setting of the **Black TAC** separately from the total area coverage (**TAC**). As pure black is used in some digital printing systems as darkest printing color, the **Black TAC** can be reduced to 100% which results in a black point with a significantly darker (lower) L* value of 9.8. Using a separate setting for the **Black TAC** achieves a significantly higher and better contrast than a **TAC** which is linked to a **Black TAC** of 275%. Additionally, a total area coverage (**TAC**) of 300% ensures highly saturated colors. These precise settings are only possible with separate **TAC** values



Once you have set all your parameters, click “Next” to get to the “Profile Settings” window. Please refer to chapter 3 “Profile Settings” of this manual for the available options.

Chapter 5

Update Printer Profile



5. Update Printer Profile

The Update Profile tool allows creation of optimized ICC printer profiles for RGB, CMYK and Multicolor color spaces, without the need to be a color management expert. Easily adjust the users current printing condition to any given print standard including both international and house standards. Generate an updated profile based on a reference profile with just a few color measurements quickly and easily. Soft and digital proofs will simulate how customer data will be reproduced on the users printing machine and digital printing will produce great color results as well. No matter how the printing variables change, be it a change in the substrate, a color or other parameters, the Update Profile tool and the professional conversion of print data via Correction DeviceLinks created with DeviL provides a solution.

***Note**: Updating printer profies of multicolor profiles requires a Multicolor-License.*

5.1 Profile Updating Examples:

- Adapting to a different paper white
- Adjustment to a different tone value based on a different substrate
- Compensation of color shifts due to a different ink
- Creation of house standards based on standard profiles
- Optimizing color reproduction in digital printing

5.2 Updating Printer Profile procedere

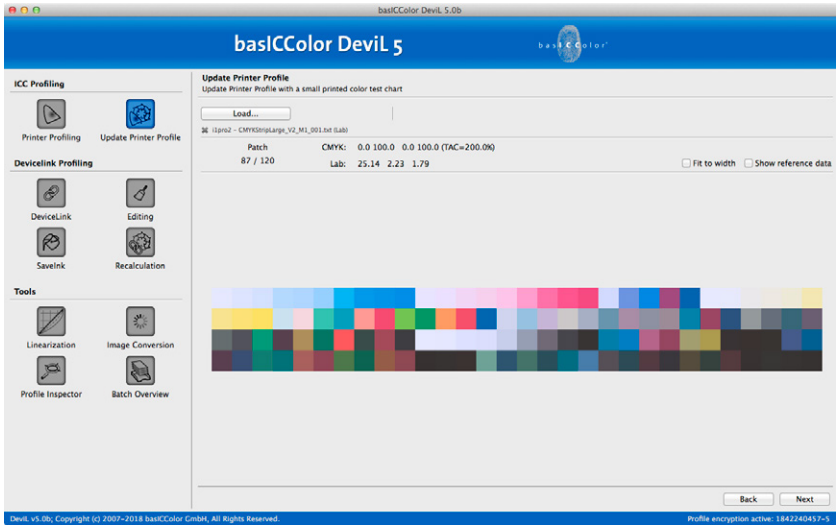
First print a rep-rofiling test chart on the printer you want to update. Depending on your needs please choose the Re-Profiling RGB or Re-profiling CMYK targt. You can download the targets from our website:
https://www.basiccolor.de/measurement-jobs/

Even though reprofiler test charts contain relatively few color patches, they are able to produce very accurate profiles.

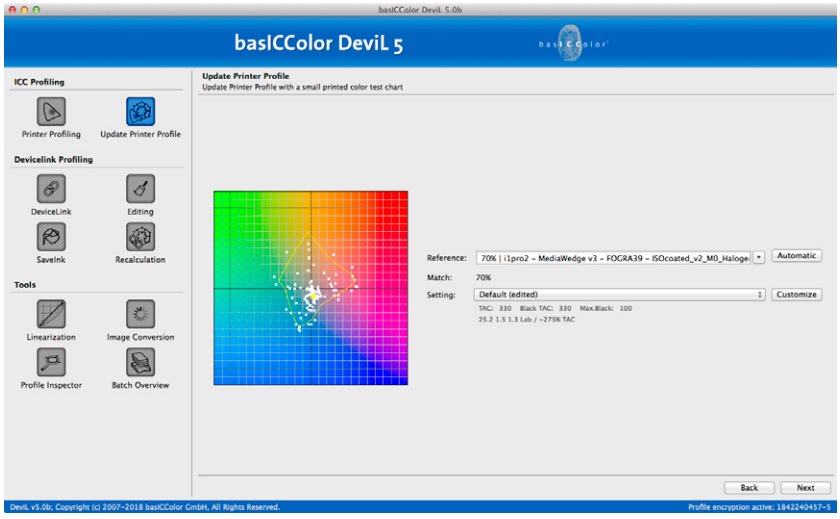
***Note**: When printing the test chart please make sure to deactivate all color management conversions and use the same calibration, CtP or printer driver settings as those of the existing profile (Reference profile)*

Load...

Now measure the target (e.g. with basICColor catch) and then load the measurement data. As soon as the measurement data has been loaded, the target will be displayed in the main window together with the color values.



Click „**Next**“.



Select the printer profile to be updated from the drop-down menu **Reference**. The **Match** between the measurement values and the gamut of the reference profile is specified in percentage for all profiles of the drop-down menu. **Automatic** will select the profile which best fits the measurement data of the reference profile. The **Match** for the selected profile is shown below the drop-down menu.

***Note**: Based on the selected measurement data only profiles with matching color space are displayed (RGB, CMYK, Multicolor). Please note that the best matching profile may not be the correct profile!*

***Note**: All profile drop-down menus function like search fields. Simply type in some letters of the desired profile and only those profiles containing these letters will be shown in the list. To select a profile simply click on it.*

Alternatively, you may open the drop-down menu with the little arrow on the right and select a profile from the full list as usual.
The 2D view of the gamut shows the measurement points of the reprofiler test chart and the gamut border of the selected reference profile. If there is a very high match of about 90 to 100%, the measurement values are in good agreement with the gamut of the reference profile.

***Note**: If you are unsure whether you require a new printer profile, simply print out a reprofiler test chart, measure it and check the **Match** between your printer profile and the measurement values. If there is a match of 90% or more a new printer profile is usually not required.*

Select a **Setting** for the updated profile from the drop-down menu. This affects the gamut mapping, separation, total area coverage (**TAC**), Black Point (**Black-TAC**) and the **Max.Black** value (among others). The values for the last three profile parameters are shown below the drop-down menu.

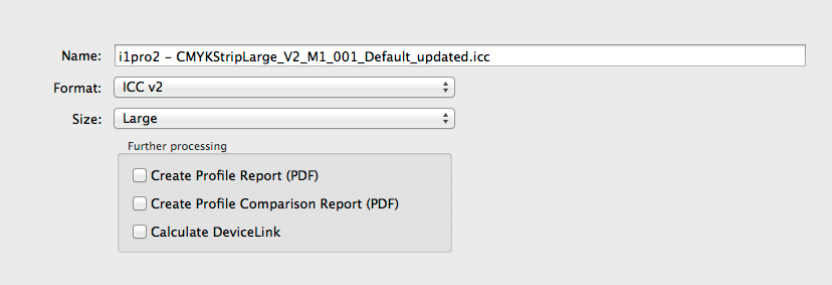
***Note**: It is recommended to use the setting **Default | Use settings from reference profile** for standard printing applications and the setting Digital Printer for digital printing.*

However, if you wish to adjust these profile parameters, select Customize. The tab **General** *allows configuration of the settings for Perceptual Rendering, Measurement Processing, Viewing Condition and Highlights. In the tab* **Color Generation** *the settings for Color Generation, total area coverage (TAC), black point (Black-TAC) and the Max.Black value can be adjusted.*

Read Chapter 4.1. Setting for a detailed description on the available setting.

After the correct reference profile and the desired profile settings have been selected click „**Next**“

In the appearing window several settings for profile calculation can be determined, such as the Name, the Format, the Size and Further processing. The identifier ‘updated‘ is added to the name to mark the updated profile as reprofiler profile.



A **Profile Comparison Report** can be created in addition to or as an alternative to a **Profile Report**. It provides information about the extent to which the reference and updated profiles reflect the measurement data and the improvements that can be achieved using the updated profile.

By activating the checkbox **Calculate DeviceLink** a correction DeviceLink profile can be created for the updated printer profile at the same time. This allows customization of the print data to compensate for color variations and to achieve a color reproduction which truly reflects the reference profile before the color changes. Using this correction DeviceLink profile ensures a consistent color reproduction.

***Note**: The correction DeviceLink profile will be created automatically assigning the name automatically as well. The assigned profile name consists of the source and target profile and the name of the default setting (for example, Digital Printer, InkJet, etc.). If a different name is preferred, or if settings need to be edited, the correction DeviceLink profile can be created manually (using the tool Devicelink Profiling). The reprofiler DeviceLink can then be selected in the color server ZePrA under **Configurations** in the tab* **Document / Target** *as (correction)* **DeviceLink profile**.

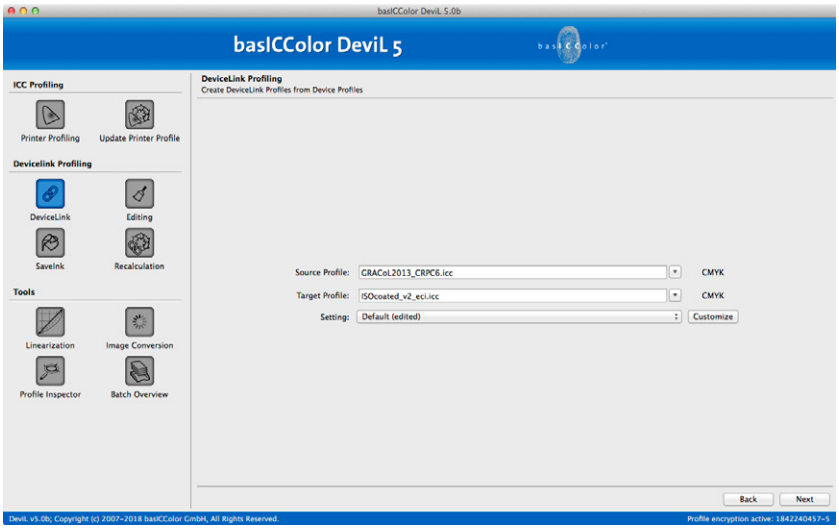
Chapter 6

DeviceLink

6. DeviceLink

DeviceLink profiles offer some advantages in comparison to device profiles:

- DeviceLink profiles perform a direct conversion between input and output color spaces. Color values or color combinations can be protected or individually customized and will only be altered where necessary.
- DeviceLink profiles compensate many weak points of conversions using ICC output profiles. For example, the DeviceLink allows preservation of the black channel so that text is printed with black ink rather than using four inks.
- In addition, ink can be saved (SaveInk) and the result can be adapted to the paper white.
- In proofing iterated DeviceLinks also provide a substantially increased proof quality.

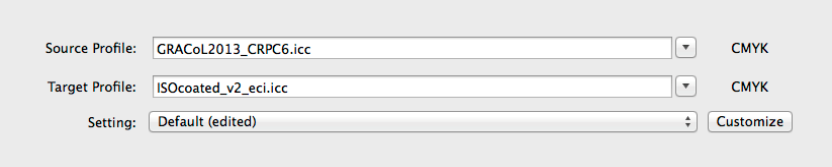


DeviL allows creation of DeviceLink profiles for all combinations of color spaces: Gray, RGB, CMYK and Multicolor. Arguably, the most important applications are conversions of CMYK-to-CMYK, RGB-to-CMYK, CMYK-to-Multicolor and Multicolor-to-Multicolor. DeviceLink profiles thus complement the color conversions of 'normal' ICC output profiles and are often used for special applications in order to achieve significantly better results, for example in conversions of CMYK data for various printing processes.

ICC printer profiles are needed to create DeviceLink profiles. If you do not have printer profiles yet, you can easily create them in DeviL (using the tool Printer Profiling from the sidebar).

6.1. Main Window

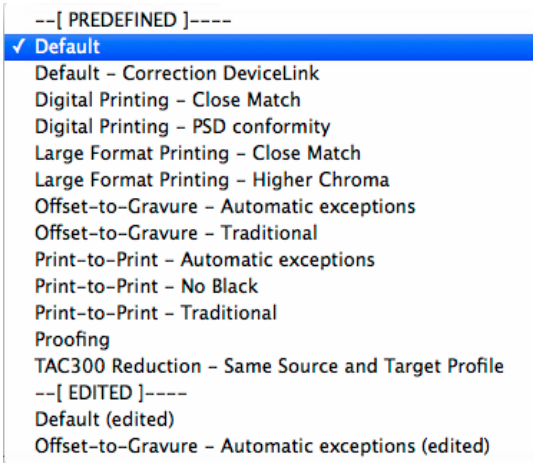
Select the following in this window:



Source Profile: Specifies the source profile for the conversion.

Target profile: Sets the target profile.

Setting: Select one of the PREDEFINED settings (for example Proofing or Print-to-Print) or an edited setting. Predefined settings can be modified and saved.



Default: Start with this preset if none of the other presets match your requirements. Then adapt to your needs.

Default – Correction DeviceLink: Default setting for creating a Correction DeviceLink profile.

Digital Printing – Close Match: If you want your digital prints to look as similar as possible to the source profile, select this preset. Digital Printing – PSD conformity: For digital prints according to “Fogra ProcessStandard Digital Printing”.

Large Format Printing – Close Match: If you want your large format prints to look as similar as possible to the source profile, select this setting.

Large Format Printing – Higher Chroma: Results in more colorful large format prints.

Offset-to-Gravure – Automatic exceptions: For conversion of offset data into gravure. Exceptions are determined automatically and the separation properties of the source profile are retained.

Offset-to-Gravure – Traditional: For conversion of offset data into gravure. Exceptions are predefined and the separation properties of the source profile are retained.

Print-to-Print – Automatic exceptions: For offset or newspaper printing. Exceptions are determined automatically and the separation properties of the source profile are retained.

Print-to-Print – No Black: Creates a DeviceLink profile without black separation. The exceptions are set so that no black is generated.

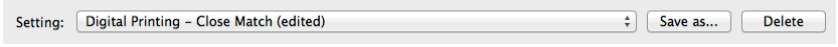
Print-to-Print – Traditional: For offset or newspaper printing. Exceptions are predefined and the separation properties of the source profile are retained.

Proofing: For proofing applications. The rendering intent is set to absolute colorimetric and all exceptions are disabled.

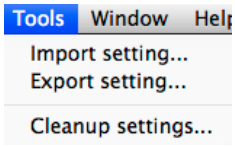
TAC300 Reduction – Same Source and Target Profile: To set the ink application reliably to 300% in your print data. Note that the source and target profiles must be identical.

You can also create and edit your own settings. To do this, click **Customize.**

If you want to give the setting it's own name change one of the parameters and then click the **<Save as>** button and enter a name. The **<Delete>** button will erase your setting without warning. Default presets in basICColor DeviL cannot be deleted.



In the tabs **Rendering**, **Exceptions** and **Black Generation** you can modify your settings further.



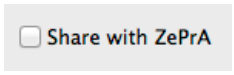
Import, Export or Cleanup of Profile Settings

Import setting: Settings can either be imported as configuration file via the Tools menu using the entry Import setting or by dragging an ICC profile with the desired settings on the drop-down menu **Setting**. The name of imported profiles receives the suffix (imported). If an inappropriate profile (for example an RGB profile for CMYK profiling) is dragged on the drop-down menu **Setting**, an error message appears.

Export setting: Customized profile settings can be selected in the drop-down menu Setting and exported as configuration file by using the entry Export setting from the Tools menu.

DeviL's default settings cannot be exported. Standard settings are listed in the drop-down menu **Setting** under the entry **[PREDEFINED]** and can be customized, but they cannot be overwritten. After customizing any setting the name receives the suffix (**edited**). It is now a custom setting which is listed under the entry [**EDITED**] and thus can be exported. Edited settings can be saved under any name. Saved settings will be removed from [**EDITED**] and listed under [**SAVED**]. Saved and edited settings can be deleted manually.

Cleanup settings: All settings found under the entry [**EDITED**] will be deleted.

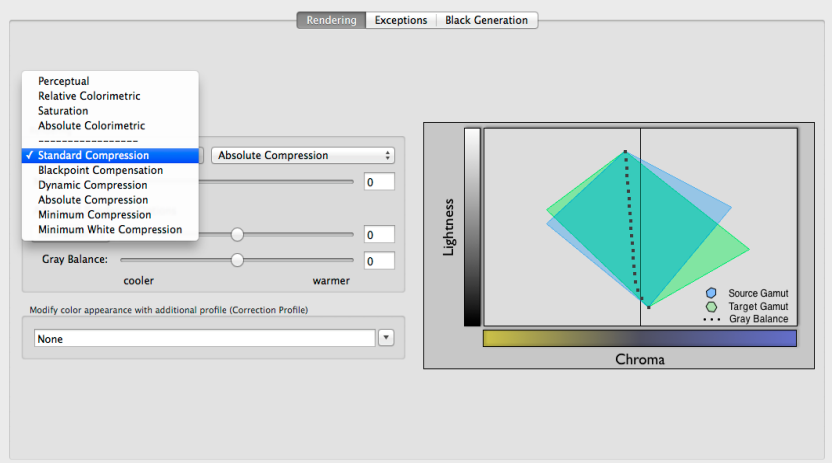


Sharing settings with ZePrA

The SmartLink Method in ZePrA allows calculation of the necessary DeviceLink and/or SaveInk profiles for the conversion of PDF files on-the-fly, without the need to create these DeviceLinks in advance. Due to the integration between DeviL and the color server ZePrA, profiling settings can be specified in DeviL which will then define the settings to be used for the calculation of DeviceLink profiles in ZePrA. By enabling **Share with ZePrA** the settings of the DeviceLink and SaveInk profiles are directly sent to ZePrA where they can be used in configurations right away.

6.1.1. Tab „Rendering“

Every DeviceLink profile contains exactly one rendering intent. In addition to the standard rendering intents – Perceptual, Relative Colorimetric, Saturation, and Absolute Colorimetric – DeviL offers six additional rendering intents. The standard rendering intents use the gamut mapping of the source and target profile and cannot be merged. The additional rendering intents, however, can be merged. Chroma, saturation and lightness can be customized for all rendering intents. All this allows to individually adjust the rendering for a specific application.



- **Standard Compression:** Our standard method, which is well suited for most applications. Neutral tones are converted using a relative colorimetric approach. If the paper white of the target profile is significantly more yellow than the source profile, the gray axis will look more yellow as well. If the target profile has a smaller color gamut than the source profile, the contrast range will be adapted to avoid a loss of image definition.

- **Black Point Compensation:** Use **Black Point Compensation** to achieve the same results with a perceptive conversion as with “Relative Colorimetric with Black Point Compensation”. When converting from a large to a small color space, the image definition is preserved in the highlights and shadows, unlike with a pure **Relative Colorimetric** conversion. Neutral tones are converted using the fk/intend. Out-of-gamut colors are cut off

- **Dynamic Compression:** Compares the source color space with the target color space and generates a compression that minimizes out-of-gamut areas. This setting preserves the brightness of the original color space while reducing the saturation, and therefore also preserves the image definition. As for the Standard Compression, the gray axis of the conversion is build relative to the paper white of the target profile.

- **Absolute Compression:** This method is based on the absolute colorimetric intent but shows some differences. The contrast range in the highlights and shadows is adapted to avoid any loss of image definition. The rendering of neutral colors is based on absolute colorimetry without paper color simulation in the highlights. If the paper white of the used printing medium is significantly more yellow than the reference, the gray axis will look neutral despite the yellowish paper white.

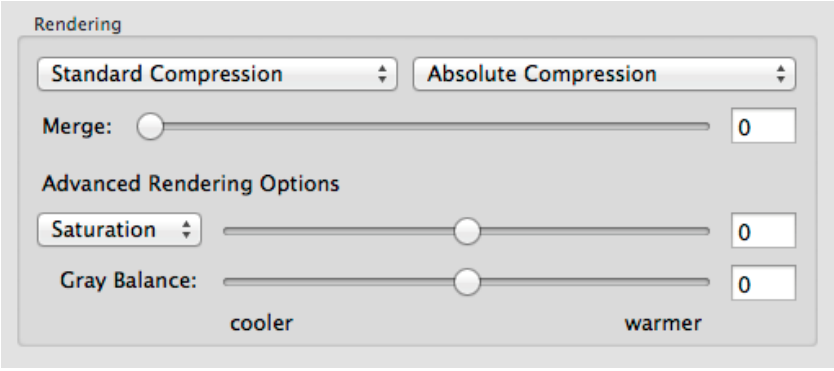
- **Minimum Compression:** This method is largely similar to the absolute colorimetric intent and only compensates close to the black and the white point. Maximum shadow contrast will be achieved and image definition will be preserved while the paper white will not be simulated. Use this rendering intent if you would like to achieve a very close reproduction, for example when using print standards like ISO Coated V2 or GRACoL2006 Coated1v2 on a digital printer.

Note: *As for the absolute colorimetric rendering intent, ensure that the target color space is larger or has at least a similar size to avoid any loss of image definition. For color conversions from larger to smaller color spaces use Absolute Compression to maintain the gray balance of the source color space.*

- **Minimum White Compression:** Is similar to Minimum Compression. Both rendering intents compress the white point without paper simulation, however, there is an important difference: The Minimum Compression is a rather perceptual rendering that additionally compresses the black point so the maximum dynamic range is utilized without loss of detail in the shadows. In contrast, the Minimum White Compression compresses the white point but not the black point, so a close match between source and target color spaces can be achieved. This can be useful for the color representation across various media, color matching or printing on slightly differing media. It can be regarded as close to absolute colorimetric rendering.

Additional Options

Merge: Use two rendering methods, merge them in defined proportions when creating the DeviceLink profile. For instance, choose the combination Standard Compression (1st selection, left) and Absolute Compression (2nd selection, right) and set the Merge slider to 75, the corresponding proportions of the two rendering methods are used in the DeviceLink profile when converting files. In this example, the gray axis would be 75% adapted to the paper color, without paper color simulation in the highlights and with a simultaneous adaptation of the contrast range in the highlights and shadows.



Advanced Rendering Options

Advanced Rendering Options: The drop down menu allows changes to the overall Chroma, Lightness or Saturation of the profile using a slider.

Chroma can be used to reduce or increase the chroma of highly saturated colors in the range between -20 and +20.

Saturation can be used when highly saturated colors are required. As with Chroma, the gray balance is not affected when moving the slider. Saturation can be used especially for large color spaces such as gamut extending Multicolor in order to achieve more brilliant colors.

Notes:

- basICColor intentionally keeps the chroma effect moderate. However, when increasing the chroma, ensure that the setting neither causes a loss of image definition in highly saturated colors or adversely affects colors such as skin tones.

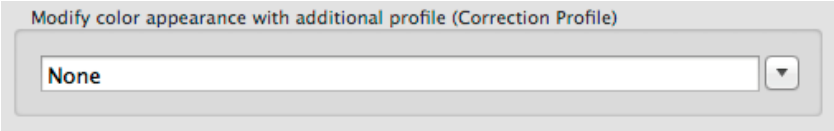
- The effect of each of these settings is shown in the gamut graph on the right. Increasing the saturation results in higher chroma and lower lightness, so more saturation will slightly darken the colors and they will appear more vibrant. In contrast, more chroma can result in high chroma colors being out-of-gamut and these colors would not be rendered by the given profile.

- Gray Balance: Allows adjustment of the gray balance to create a cooler or warmer gray axis. cooler shifts the gray balance towards more bluish colors (negative b* values), warmer shifts it towards yellowish colors (positive b* values). The effect of the slider setting is visualized in the graphic.

- The setting Gray Balance works independently from the selected Rendering and allows visual adjustments based on personal color preferences.

Modify Color Appearance with Additional Profile

Incorporate a correction into a DeviceLink profile by using an additional profile, such as an edited DeviceLink or an abstract profile. The additional profile may contain a selective color correction in a certain color range or specify a change in the gradation tonalities. The additional profile will be included in the calculation after the source profile is linked to the target profile.



The **Modify color appearance with additional profile** represents special situations, therefore the setting None should be selected in most cases.

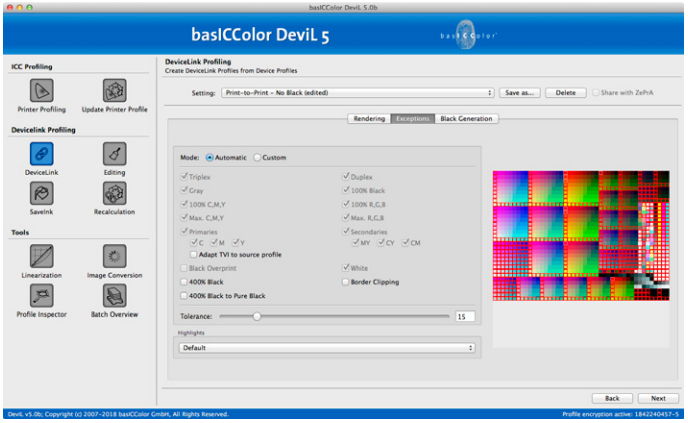
***Note**: Further information about the creation of edited profiles can be found in the section DeviceLink Editing.*

6.1.2. Tab „Exceptions“

Exceptions are used to allow targeted color conversion of special colors. If the source and target colors are the same, the colors are linearized. If the color spaces are different, they are optimized and adapted. Exceptions ensure that special properties of colors are preserved. The basICColor Optimize-technology obtains the property of the input colors (for example, using one color channel of primary colors or using two color channels for secondary colors), but calculates the optimal combination in order to minimize color errors.

Depending on the color space combination, varying excep- tions are available for use when creating DeviceLink profiles.
Exceptions are calculated in the background using the basICColor Optimize-technology, whereby the color value providing the best color match is calculated. If the **<Triplex>** option is activated as an exception, all other options influ- enced by it are also automati- cally activated. The purity of Gray, 100% Black, Duplex, Primary colors and Secondary colors is preserved in the DeviceLink profile as a result. If **<Duplex>** is selected, the purity of all Primary colors, Gray and 100% Black is preserved.

A further setting option, **<Adapt TVI to source profile>**, has been added under **<Primaries>** for CMYK-to- CMYK DeviceLink profiles. This option is important if you want to exactly preserve the tone value increases of the primary colors. One application would be a situation where you want to print in accordance with a particular printing standard, but on a different paper, and the profile used for the purpose has different tone value increases. A DeviceLink profile created by using the new option corrects the tone value increases in such a way that they correspond exactly to the required printing standard (from the source profile).

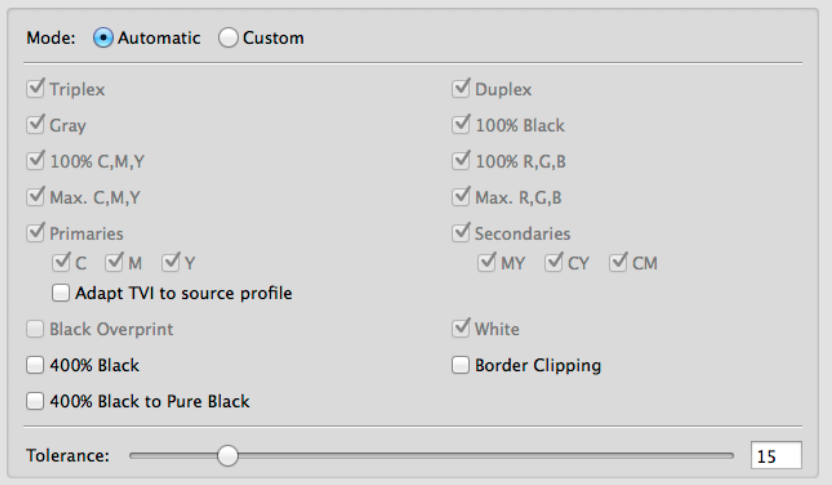


Automatic Exceptions

The proper choice of exceptions in DeviceLink profiling can sometimes be an art in itself and ensures hue-accurate, pure and saturated colors as well as print optimized color behavior, for example when overprinting. In order to facilitate this choice, the tab Exceptions contains an option for the automatic selection of the most appropriate exceptions for the selected source and target profiles. Here, different kinds of calculations for color rendering, color distances, device color differences as well as empirical values regarding the preservation of color purity will be combined.

To activate this function, select the mode Automatic. After a short calculation time recommended exceptions are either enabled or disabled. All automatically identified exceptions are grayed out. Exceptions that are not implicated are not grayed out and can be activated or deactivated manually. This makes it much easier to choose exceptions appropriately.

***Note**: We recommend enabling the automatic selection of exceptions for the creation of DeviceLinks by default in order to obtain a good preselection. If you prefer to select exceptions manually or if you would like to adjust the automatically determined settings, select the mode Custom. If you have manually selected exceptions or a DeviceLink preset and then switch to Automatic, previous settings will be overwritten.*



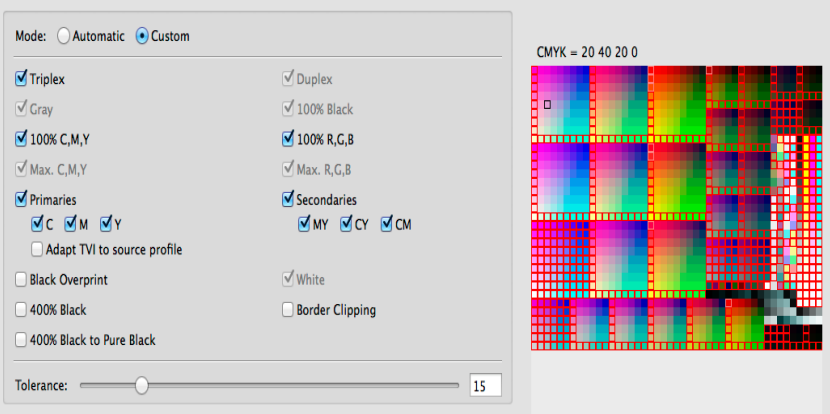
Custom Exceptions

Exceptions are used to specifically influence color conversions of special colors. If source and target colors in a color conversion are identical the colors will be linearized. If the color spaces differ, the colors will be optimized and adapted.

Exceptions ensure that special properties of colors remain unchanged. The choice of appropriate exceptions thus allows a precise color conversion of specific colors. Exceptions preserve the properties of the input colors (for example using a single color channel for primary colors or two color channels for secondary colors) and calculate the best possible combination to minimize related color errors.

All color patches that are affected by the selected exception are highlighted in the graphical representation by a red border. If you move the mouse pointer over a color patch it is emphasized by a black or white border and the values of the source and target color space are displayed. Press the “Alt” key on your keyboard to capture the color patch allowing you to check quickly and easily whether it is affected by an exception.

Exceptions which are not available are grayed out. This may be the case when a dependency between exceptions exists, or when exceptions are not relevant for a specific color space.



Triplex (two primary colors plus black): Optimizes the color conversion of a secondary color (for example, blue: cyan plus magenta) plus black by preventing color contaminations. Triplex colors are recalculated during the conversion but remain triplex colors in the target profile. Therefore, if you have a dark shade of blue, like 100C 60M 50K, and you would like to convert it to the most suitable blue represented in the target color space consisting only of cyan, magenta and black, the exception **Triplex** must be activated.
The exception **Triplex** includes the exception **Duplex** and therefore also the exceptions **Primaries, Secondaries, Gray** and **100% Black**.

Duplex (a primary color plus black): Optimizes the color conversion of a primary color (cyan, magenta or yellow) plus black by preventing color contaminations. Duplex colors are recalculated during the conversion but remain duplex colors in the target profile. The exception **Duplex** includes the exceptions **Primaries, Gray** and **100% Black.**

Gray: Protects the single-color structure of Black from 0 to 100%. This exception includes the exceptions **100% Black** and **White**.
For RGB DeviceLink profiles **Gray** ensures that the gray axis is composed of equal RGB value proportions. For a conversion of an RGB source profile into a CMYK target color space, Gray ensures that the RGB gray axis is created by black only.

100% Black: Protects 100% black, so 100% K remains 100% K and will not be supplemented with or replaced by CMY.
For a conversion of an RGB source profile into a CMYK target color space **100% Black** ensures that an RGB black of 0, 0, 0 is converted to 100% black. For example, this allows you to prevent a pure black RGB text from being composed of four colors in the CMYK profile after the conversion.

100% C,M,Y: Protects cyan, magenta and yellow. The 100% values of C, M and Y are retained after the color conversion at 100%.

100% R,G,B: Protects pure red, green and blue. The 100% values of red, green and blue are retained after the color conversion at 100%. Red will therefore still be formed with 100% magenta and 100% yellow.

Max. C,M,Y: Creates a maximum saturation of primaries. This function can be used independently of the protection of primaries and secondaries.

> ***Example**: If 100C would be converted to 80C + M + Y, activation of this exception ensures that cyan is now converted to the maximum value, which means, C is set to a value higher than 80, i.e. a value between 80C and 100C, depending on what is achievable in terms of maximum saturation while contaminating color proportions are adjusted color corrected.*
>
> ***Note**: If the exception **Primaries** is selected as well, the exception **Max. C,M,Y** is grayed out while the exception **100% C,M,Y** is activated instead, as in the case of a purity protection of primaries the maximum value is 100%.*

Max. R,G,B: In CMYK color spaces 'R, G, B' corresponds to the color combinations MY, CY and CM. When activated, the higher color value is set to 100% while the second color value is optimized colorimetrically. This function can be used independently of the protection of primaries and secondaries.

> ***Example**: If a pure 100% red (100% M+Y) would be converted to 95% M and 90% Y in a conversion with pure secondary colors, activating the setting **Max. R,G,B** increases the color red to maximum saturation, like 100% M and 95% Y. However, if you require that 100% red remains 100% red in the conversion, use the setting **100% R,G,B.***
>
> *Note, however, that this might not be the best colorimetric value. **Max R,G,B,** on the other hand, calculates the best color correct value with the highest level of saturation.*

Primaries: Protects the single color structure of primary colors. Calculates the Lab value of a primary color of the source profile and searches for the best matching primary color value in the target profile. For example, 40C might be converted to 53C but the single color structure remains. If this exception is not enabled, primary colors of the source profile may be contaminated in the target profile. The checkboxes C, M and Y allow protection of individual primaries. Here, optimized transitions are calculated which gently extend into adjacent color areas in order to avoid hard edges.
The slider **Tolerance** allows to specify how far adjacent color areas are included.

*Note: Enabling this exception does not preserve the 100% values which means that 100C might be converted to 98C. If you would like to conserve the 100% values in the target profile, enable the exception **100% C,M,Y.***
In case of a conversion of an RGB source profile into a CMYK target color space, Primaries ensures that the primary colors C, M and Y are kept pure.

Adapt TVI to source profile: This exception is important when tone value increases of primary colors needs to be preserved precisely. An application example would be a predefined printing standard that needs to be printed on a different paper while the used target profile featured a different tone value increase. The exception **Adapt TVI to source profile** allows creation of a DeviceLink profile which corrects the tone value increases of the target profile to meet the requirements of the printing standard (from the source profile) precisely.

Secondaries: Protects the two-color structure of secondaries. Calculates the Lab value of a secondary color of the source profile and searches for the best matching secondary color value in the target profile. For example, 40C 100M might be converted to 41C 97M but the two-color structure remains. If this exception is not enabled, secondary colors of the source profile may be contaminated in the target profile. The checkboxes **MY, CY** and **CM** allow protection of individual secondaries. Here, optimized transitions are calculated which gently extend into adjacent color areas in order to avoid hard edges.

The slider **Tolerance** allows to specify how far adjacent color areas are included.
In case of a conversion of an RGB source profile into a CMYK target color space, **Secondaries** ensures that the secondary colors MY, CY and CM are kept pure.

Black overprint: Protects 100% black as additional layer above a CMY background: CMY values are minimized but colors are calculated correctly and changed as little as possible compared to the original.

White: Protects the paper white. This is especially useful when you would like to achieve an absolute colorimetric simulation for proofs without a simulation of the paper color (e.g. for aesthetic reasons). Is available only if **Absolute Colorimetric** is selected as **Rendering intent** and **Proofing** as a **Setting**.

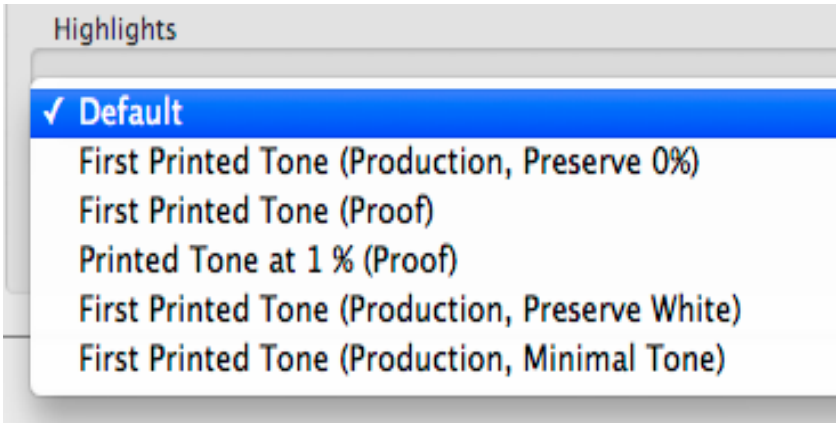
400% Black: Protects 400% Black: Even when a lower Total Amount of Color (**TAC**) is selected in the tab **Color Generation**, a color value of CMYK = 100%, 100%, 100%, 100% is maintained.

Border Clipping: Percentage values close to zero will be set to 0% and key values close to 100% will be rounded up to 100%. This results in pure tones which no longer need to be screened in prining.

400% Black to Pure Black: 400% inks will be converted to 100% black, so CMYK = 100%, 100%, 100%, 100% will be converted to CMYK =0%, 0%, 0%, 100%.

Highlights

In flexo printing, the first printed tone is often subject to a rather high tone value increase. Additionally, in some flexo printing processes, there is no transfer of tone values below a certain percentage in the highlight areas. However, the simulation of those process properties is particularly important for proofing applications to truly simulate the final print result in the highlights. It may also be necessary to increase the tone values in the highlights when using the profile for production or separation. For that reason, DeviL has six settings to adjust the Highlights when creating DeviceLink profiles.



These settings specify when the **First Printed Tone** in the profile is recognized and appears in the proof (hard or soft proof) or how high the tone value prints at 1%. This ensures that your proof matches your printout. Analogically, when a profile is used for separation which was created with a value of 3% for the first printed tone, small tonal values will be raised to 3% to be printed reliably. By selecting a setting for the first printed tone you can determine whether the created DeviceLink is intended for **Proof** or **Production**.

Default: Ensures 'normal' profiling behavior in highlight areas. Use this setting for all printing processes that don't require any adjustment of the first printed tone.

First Printed Tone (Production, Preserve 0%): The paper white remains unaffected. Small tonal values will be increased to the entered percentage to be printed more reliably. The purity of colors set in the tab Exceptions will be preserved. This may result in hard edges.

First Printed Tone (Proof): Use this setting to specify when the first printed tone will appear. For example, if you enter 3% for the first printed tone, no tonal values will be printed from 0 to 3%. Color values will start only from 3%.

Printed Tone at 1% (Proof): This setting defines the tone value to be reached at 1%. It is popular for proofing but can be used for production applications as well.

First Printed Tone (Production, Preserve White): The paper white remains unaffected. Low tones will be increased to the entered percentage throughout the separation to be printed more reliably. The settings defined in the tab **Exceptions** are not retained as a tone is composed using all channels. This reduces hard edges.

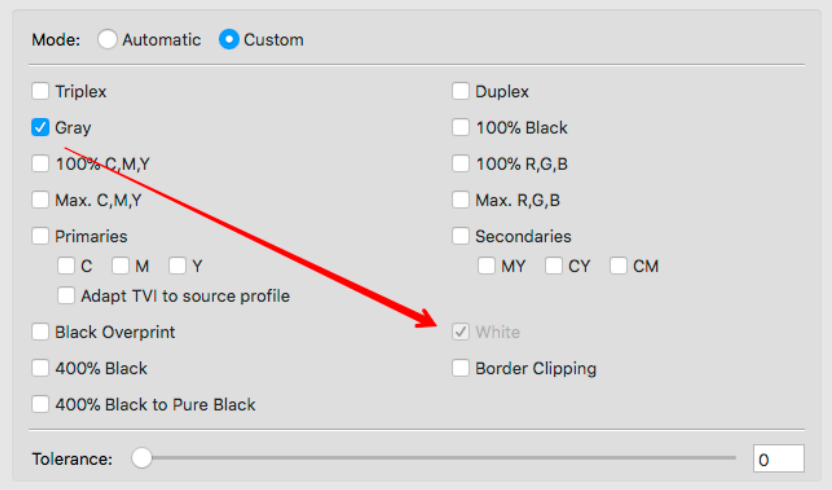
First Printed Tone (Production, Minimal Tone): The paper white will be replaced by the set tonal value in all channels throughout the separation.The settings defined in the tab **Exceptions** are not retained as a tone is composed using all channels. This reduces hard edges.

Dependency between Gray and White exceptions in Soft Proofs

The rendering intent Absolute Colorimetric is often used in proofing in order to determine how printed colors will be affected by the color of the paper. It is important to point out that a dependency exists between the exceptions Gray and White when selecting the setting Proofing and the rendering intent Absolute Colorimetric in DeviL.

When creating DeviceLink profiles using the rendering intent Absolute Colorimetric the simulation of the paper color will be prevented when the exception Gray is activated. The use of these exceptions in combination with the rendering intent Absolute Colorimetric is contradictory and therefore not recommended.

For this reason, all exceptions are disabled by default when the setting Proofing is selected in DeviL. In order to make this dependency even clearer, the exceptions White and Gray are linked to each other. When an exception which is connected to Gray (e.g. Duplex or Triplex) is activated, the exception White will be disabled and grayed out automatically.

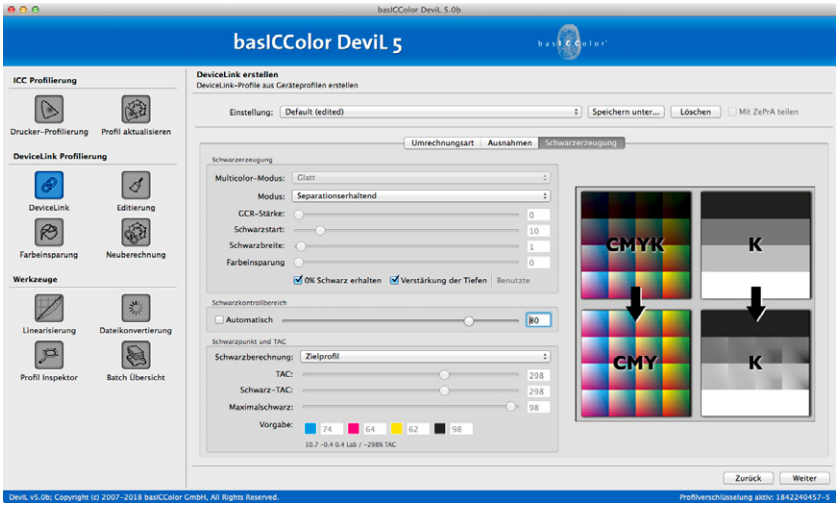


***Note**: Please note that the exception White is only available when Absolute Colorimetric is selected as Rendering intent. The exception White ensures that paper white is not simulated which is especially useful when trying to achieve an absolute colorimetric simulation for proofs without a simulation of the paper color (e.g. for aesthetic reasons).*

6.1.3. Tab „Black Gerneration“

„Black Generation“ adjustment options

„Black Generation“ defines the method that generates black in the target color space.



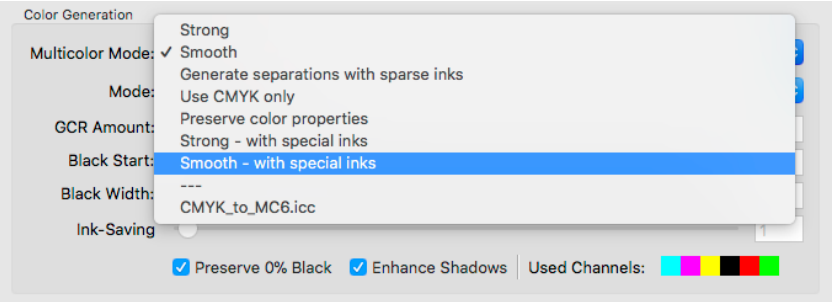
Multicolor Mode

Multicolor Mode: Determines how colors will be built up in individual separations. Is only available when a Multicolor target profile has been loaded.

***Note**: A Multicolor license is required to use Multicolor features.*

In DeviL, the first three channels represent primary colors (usually CMY). They should form a sound color space (gamut) and should also be able to create a gray axis. The fourth channel should be black if a separation with UCR/GCR is desired. If black is absent in the Multicolor measurement data while automatic **Black Calculation** is selected, it will be recognized by DeviL and the separation will not be generated. Black separation is disabled if the value for **Max. Black** in the **Black Point and TAC** setting is 0%. Additional spot color channels (e.g. Orange, Green or Violet in a CMYK-OGV 7 color data set) are regarded as color space expanding colors. The **Multicolor Mode** determines how color space expanding colors are factored in together with primary colors.

The following Mulicolor modes are available:



Strong: As much spot color as possible will be applied. Accordingly, fewer primaries will be used in the highly saturated color areas. This results in a greater use of color space expanding spot colors and therefore in highly saturated colors in the printout.

Smooth: Is the default setting and should remain unchanged if a particularly smooth and harmonious separation with still saturated colors is required.

> ***Note**: The two Multicolor modes **Smooth** and **Strong** are similar but Smooth uses less color space expanding spot color channels.*

Smooth – with special colors and **Strong – with special colors**: These two Multicolor modes are designed for applications in industrial printing, such as ceramic printing, in which the main colors are supplemented by additional light (e.g. Pink) or dark (e.g. Brown) color space expanding colors. They are an enhancement of the existing Multicolor modes **Smooth** and **Strong**, however, they also use additional colors that are not commonly used. For example, the additional color pink is used with a darker magenta in magenta gradations. Here, pink is used in light areas while magenta is used in dark areas.

Notes:

- *The gray balance of these two Multicolor modes shows additional channels as bright or dark colors are incorporated into the gradations and gray balance curves.*
- *These two Multicolor modes also support light inks in profiling, such as light and dark magenta. In principle, light and dark colors should be processed in the printer or RIP (Raster Image Processor). If they are not pre-processed by the RIP they require particularly large test charts for profiling.*
- *It is also possible to combine light gray with black which in some printing processes like Flexo printing can mask noticeable artifacts in the highlights. However, appropriate test charts have to be used.*

Generate separations with sparse inks: Is of interest for the packaging market as color separations are created in such a way that a certain hue uses as much as possible of a related spot color and very little or no primary colors. For example, in order to create a red color as much as possible of a reddish spot color is used but very little to no magenta or yellow. A maximum of two or three colors are used for each color segment and, therefore, this Multicolor mode is practical to save process colors. However, black generation cannot be controlled and is based on the (separation) mode MaxK.

> ***Note**: In contrast to the Multicolor modes Smooth, Strong and Use CMYK only, the Multicolor mode Generate separations with sparse inks does not allow regulation of the Black Generation. Accordingly, these settings are grayed out.*

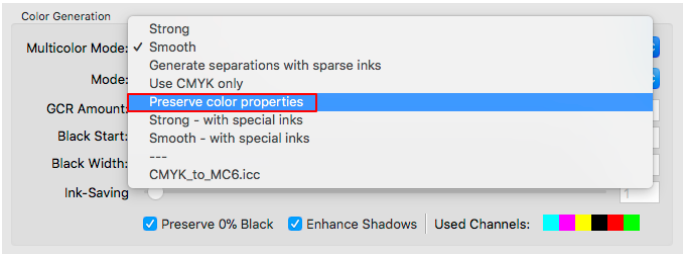
Use CMYK only: Selecting this method results in a Multicolor DeviceLink profile that creates the desired number of channels (e.g. 7 channels) but is only composed of CMYK. The color space expanding spot color channels are not used for the separation.

Notes:

- *In package printing there is sometimes a request for images and vectors composed of CMYK to be generated with only minimal changes to CMYK values and without spot colors – despite conversion into a Multicolor space. In this case, only spot colors, like Pantone colors, which are present as DeviceN in the PDF should be converted into the large Multicolor space. Such a workflow is possible in two easy steps: (1) Creation of a separation-preserving CMYK-to-Multicolor DeviceLink profile in DeviL using the Multicolor method* ***Use CMYK only.***

- *Spot color conversion of the PDF using the color server ZePrA. In DeviL all setting concerning the* ***Color Generation*** *(i.e. the entire tab) depend on black being present in the measurement data. This also applies for* ***Exceptions****. All* ***Exceptions*** *concerning black (****Gray, Black, Duplex, Triplex, Black overprint****) use black as fourth channel, therefore, black must be present in the measurement data or ICC profiles as fourth channel. If black is not present in the measurement data as fourth channel, this channel will be treated as if it were the black channel.*
  As an example, if blue is present as fourth channel, then all settings in the tabs ***Color Generation*** *and* ***Exceptions*** *will still treat the fourth – now blue – channel as black channel. In this situation, spot colors can be used for the calculation of the gray balance and the black point, which may not be desirable.*

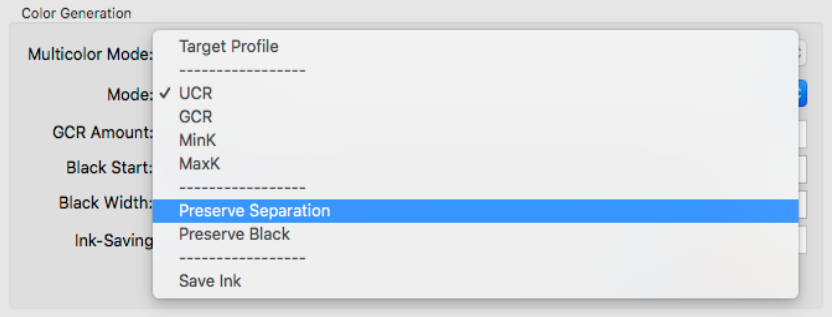
Preserve color properties: Is only available for Multicolor-to-Multicolor DeviceLink profiles which comprise the same number of channels for source and target profiles. This Multicolor mode allows to set Exceptions for all Multicolor channels rather than CMYK portions only.



Note*: Exceptions for Primaries affect all channels when using the Multicolor mode Preserve color properties. The exceptions for Secondaries keeps all two color combinations pure, not only those with CMY portions.*

Mode

Defines the method for the generation of black in the target color space and therefore influences the separation comprehensively. Eight different black generation modes are available in the drop-down menu:



Target Profile: Uses the black separation of the target profile.

UCR: Allows adjustment of the settings **Black Start** and **Black Width.**

GCR: Additionally allows the adjustment of the setting GCR Amount.

MinK: Only uses a minimal amount of black and generates a separation using the maximum amount of CMY.

MaxK: Uses a maximal amount of black and generates a separation using the minimum amount of CMY. Is only available with a SaveInk license.

The methods **UCR, GCR, MinK** and **MaxK** generate a new separation, regardless of the separation of the target profile.

Preserve Separation: Preserves the ratio between the black channel and CMY composed black.

Preserve Black: Linearizes the black value of the source profile and retains the black channel.

Save Ink: Replaces CMY colors by black to save CMY inks. This setting is only available with a SaveInk license.

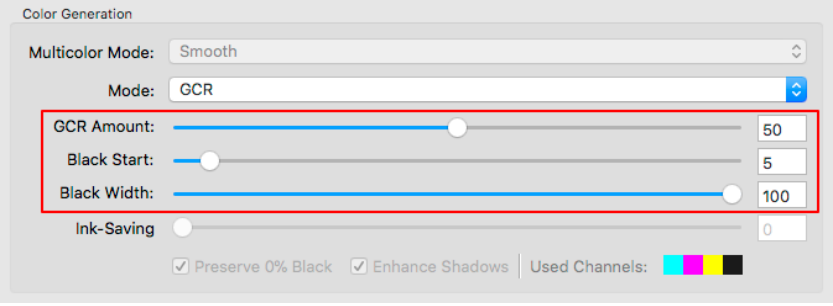
Note:

- *Preserve 0% Black: Is available when the mode Preserve Separation has been selected. It prevents the generation of a black channel in source colors without black. This is important for some overprint applications.*
- *Enhance Shadows: Is also only available when the mode Preserve Separation has been selected. Prevents detail losses in dark colors and weak shadows.*
- *The black generation mode Preserve Separation is especially important for the conversion between two CMYK color spaces, because it ensures that the ratio between CMY and black which is used to generate gray is maintained in the color conversion.*
- *When the mode Preserve Separation is selected, Enhance Shadows should always be enabled.*

GCR Amount: Defines the amount of CMY that is replaced by black. At 0 only a low GCR amount is used which mainly impacts the shadows whereas at 100 a very strong GCR is used which effects the shadows and the highlights.

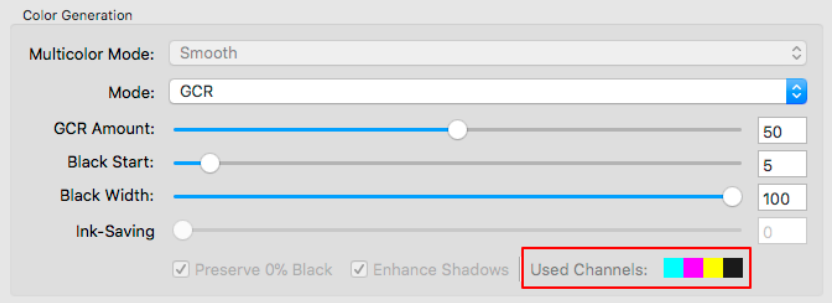
Black Start: Defines the starting point for the black generation. Black will be used if the minimum amount of C, M, Y exceeds this limit.

Black Width: Defines the range in which black is generated outside the color-neutral area. The lower the value the less black will be generated outside the color-neutral area.

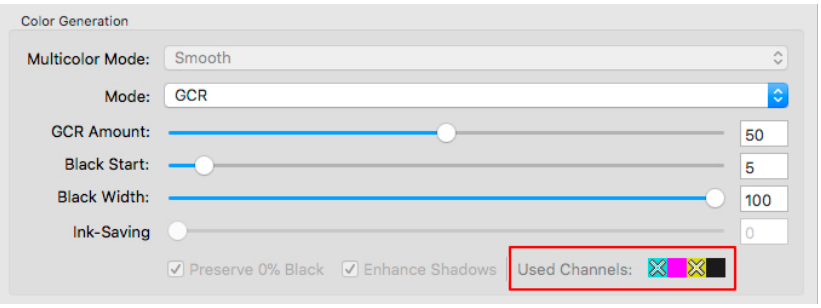


Used Channels: Defines the channels to be used in a profile and offers a quick and easy way to select or exclude channels when separating data. The effect of selecting or excluding colors on the curves is immediately visualized in the Graphic.

***Note**: If the Black Calculation is set to Target Profile, the black point is preset by the profile and the function Used Channels is deactivated.*



By default all colors of the profile are enabled. To exclude a color click on the appropriate colored box. Multiple colors can be excluded. Excluded colors will be grayed out and marked with an X. To enable an excluded color simply click on it again.ol.



***Note**: This function is particularly intelligent for Multicolor profiles, as it searches for replacement colors in the Multicolor channels when excluding a channel (e.g. Cyan), which can compensate for the missing channel in the gray balance. The alternatively calculated Multicolor channels are displayed grayed out in the panel Black Point and TAC (further information can be found in the toggle Black Point and TAC).*

***Example**: If a brown chocolate artwork is intended to be printed in CMYK without using any Cyan in the separation, a CMYK printer profile can be created which only uses MYK. These types of profiles avoid unwanted Cyan dots in the separation and the converted artwork would appear visually close to a conversion with a complete CMYK profile. Obviously such a profile should not be used if the artwork contains Cyan based color combinations, such as cyan tones and blue or violet colors.*

Graphic: Visualizes the effects of the selected color separation and Black Point settings. Provides a real time preview of the loaded measurement data when altering settings.

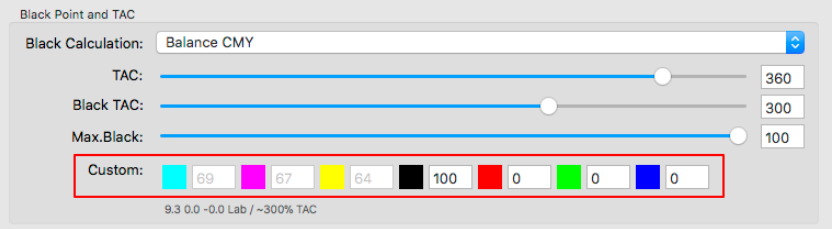
Black Control Range

Controls the transition to black. If black exceeds the limit, CMY colorants will not be modified and black is linearly added. Up to the specified value, black will be calculated accurately. A value of 0% indicates that only CMY will be converted whereas black will be linearized.

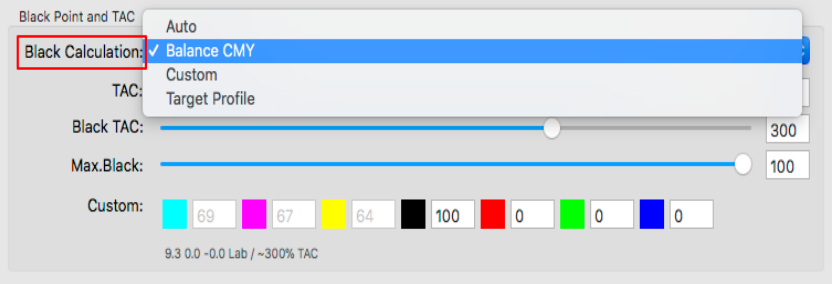
If a proof requires an exact colorimetric reproduction the slider should be set to 100%. 80% is a good value to achieve a smooth transition in the shadows. We recommend activating the checkbox **Auto**.

Black Point and TAC

In the panel **Black Point and TAC** you can define the overall Total Area Coverage (**TAC**) and the TAC for the black point (**Black TAC)**. The black TAC represents the darkest color value of the profile which is usually identical with the maximum TAC. The graphical display of each color contains a number field showing the amount of ink used in the profile. Depending on the selected **Black Calcu-lation** the number fields are either enabled or disabled



Black Calculation: Four different settings available for DeviceLink profiling (see screenshot below).

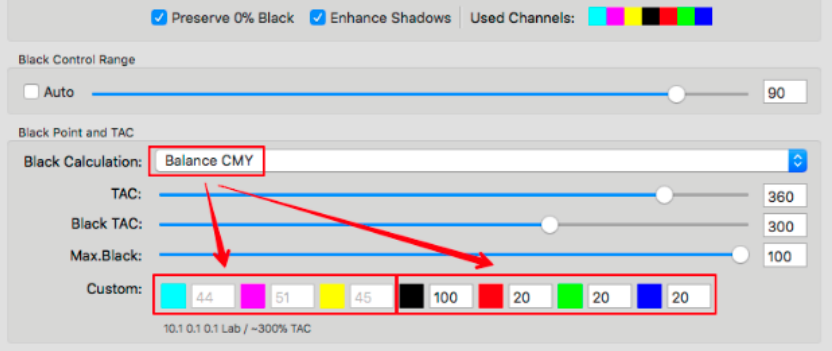


- **Auto:** The calculation of the optimal black point (dark and neutral) is based on the measurement data. The values entered for **Black TAC** and **Max.Black** define limits which are not exceeded but may be lower if technically possible. All channels are used to generate the black point (Black TAC), therefore individual channel editing is disabled. This mode will not use any Multicolor channels beside the first four channels (usually CMYK).

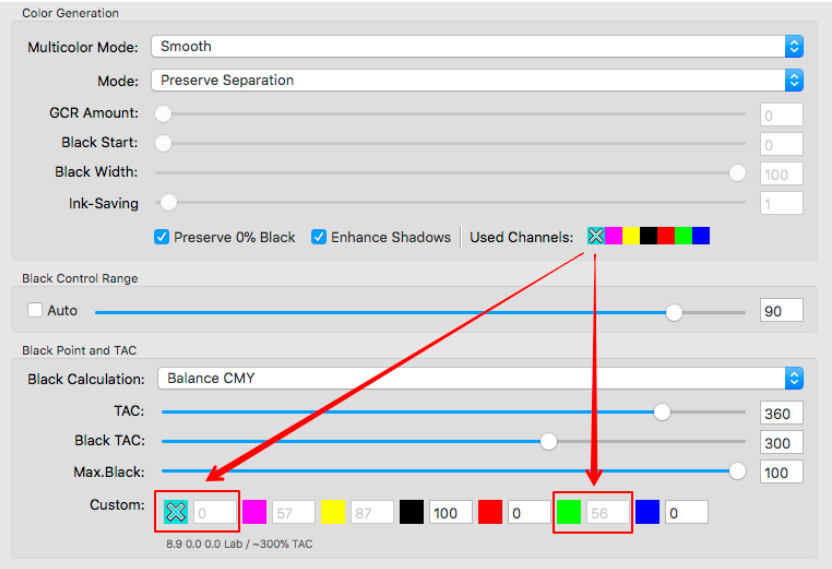
  Note: *If no default value for the Black TAC is defined, it is recommended to use 400% as a starting point for the calculation.*

- **Balance CMY:** This setting adapts the CMY values to a pre-defined Max.Black value and generates a neutral black point. Define the Black TAC and TAC in accordance with the printing conditions. The Max.Black should be set to the ideal value for your substrate. Similar to the setting Auto those values are regarded as maximum values which may be underrun if a neutral black point is not achievable. Allows customization of the black channel (or in general the 4th channel) and the addition of Multicolor channels.

Note on excluding channels: *Basically Balance CMY allows editing of the black channel (or in general the fourth channel) and the Multicolor channels. The CMY channels are grayed out (see screenshot).*



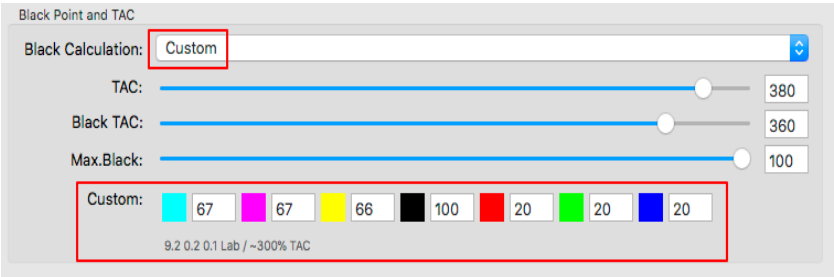
However, if a channel is excluded, the Multicolor channels are searched for a replacement color that can compensate for the missing channel in the gray balance. The replacement Multicolor channels are grayed out in the control panel Black Point and TAC (see screenshot).



- **Custom:** Allows to define the black point in the input box Custom as CMYK values. The Black TAC value will then be recalculated. Allows editing of all channels.

Notes:
DeviL calculates the Lab values based on the entered custom values. When changing custom values the resulting effects can be seen immediately. If you prefer DeviL's recommendations select the settings Balance CMY or Auto.

For Multicolor profiles with more than four channels you can use the extra Multicolor channels for the black generation besides the first four channels (typically CMYK). However, the total area coverage (TAC) cannot exceed 400%. Values for the Multicolor channels can be entered manually when using the settings Balance CMY or Auto and these values will then be used to calculate the Black TAC. Usually it is not necessary to use those channels but sometimes a dark Multicolor channel adds desired contrast and definition. This can easily be checked by viewing the Lab values below the Custom fields. If the addition of a certain Multicolor channel decreases L while a*b* values are not significantly altered, using this channel can be considered. However, the gray balance will use additional channels as well.*



***Note**: Neutral a* and b* values are the basis of the Black Calculation when selecting the settings Auto or Balance CMY. In contrast, selecting the setting Custom allows generation of a black point without neutral a* and b* values.*

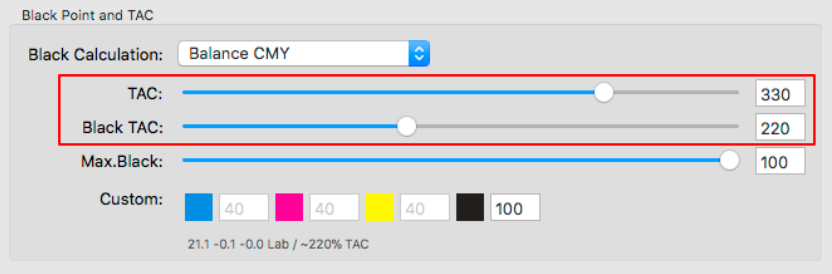
- **Target Profile:** Calculates a black point based on the values of the target profile. The values for the calculation will be displayed and all sliders will be grayed out.

Total Area Coverage (TAC) and Black TAC

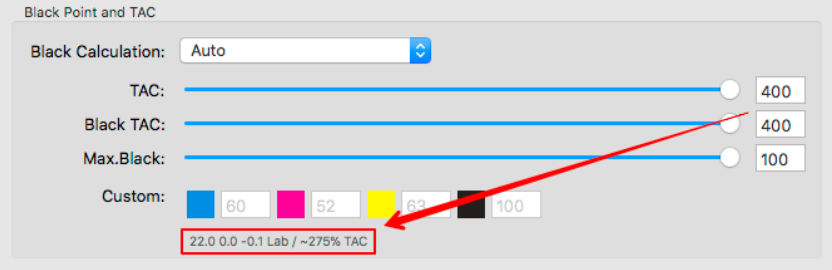
Many modern printing systems allow a black point that is generated by using a low amount of ink. Sometimes the darkest color can be printed using pure black which means in extreme cases a black point of 100% K may be sufficient. Obviously, such a low TAC does not work for other color areas – it would not even be possible to print a true red, green or blue! Therefore we separated the Black TAC from the general TAC. This allows use of the best setting for Black Calculation without restricting the color space.

TAC: Defines the value for the maximum total area coverage (value range: 0 to 400%). This value will not be exceeded. This also applies to Multicolor profiles.

Note: The sliders limit each other, so the TAC can never be lower than the Black TAC (but it can be higher).



Black TAC: The value for the black point (Black TAC), which results from your settings, will be displayed after a short calculation time below the text box Custom (outlined in red in the screenshot below).



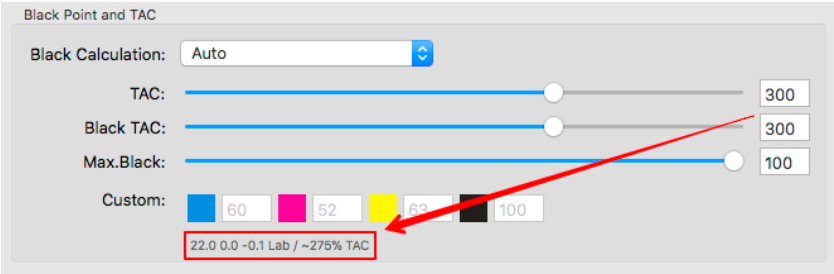
The Lab value is particularly handy for assessing the effect on the black point when changing the TAC or Black TAC. The smaller the L* value, the deeper the black and the higher the contrast.

TAC and Black TAC can be adjusted separately in DeviL

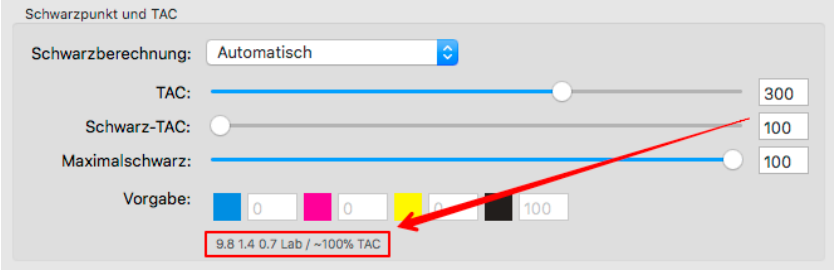
The total area coverage (TAC), defined by the separation, and the black TAC are identical in traditional printing systems, however, industrial printing applications and many digital printing systems show that the black point can be selected much lower than the total area coverage. To achieve a sound gray balance with a high contrast while maintaining highly saturated colors it is necessary to separate these two settings.

Advantages of a separate Black TAC

The importance of adjusting the **Black TAC** independently from the total area coverage (**TAC**) is demonstrated using a digital printing system. Let's assume the **Black TAC** and the **TAC** could not be set separately and we had to use identical values for both of them. If you selected the mode **Auto** to calculate the black point and set a **TAC** of 300% (and therefore a **Black TAC** of 300% as well), DeviL would calculate the best black point for this case. The result would be a total area coverage of 275% with a neutral black point (a* and b* are 0 respectively), but with a very light L* of 22.0 (outlined in red in the screenshot).



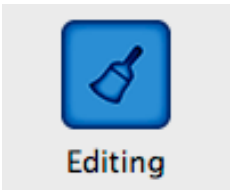
However, DeviL allows to set the **Black TAC** separately from the total area coverage (**TAC**). As pure black is used in some digital printing systems as the darkest printing color, the **Black TAC** can be reduced to 100% which results in a black point with a significantly darker (lower) L* value of 9.8. Using a separate setting for the **Black TAC** achieves a significantly higher and better contrast than a **TAC** which is linked to a **Black TAC** of 275%. Additionally, a total area coverage (**TAC**) of 300% ensures highly saturated colors. These precise settings are only possible with separate **TAC** values.



Once you have set all your parameters, click “Next” to get to the “Profile Settings” window. Please refer to chapter 3 “Profile Settings” of this manual for the available options.

Chapter 7

Editing



7. Editing

The **Editing** module is a very powerful and versatile tool.

- Create your own gamut mapping by editing, RGB to CMYK conversion for example
- Fine tune your calculated DeviceLinks
- Create gradiations corrections or selective color corrections that you can use as correction profile in basICColor DeviL
- Create abstract ICC-profiles, that produce a certain shade or look.
- Define the first printed tone, then transfer this grada- tion correction into a DeviceLink for use in flexographic printing, for example
- Record the color conversion of any tool and save it as a standard ICC DeviceLink profile with high accuracy to be able to reproduce it in ICC-compatible workflows.

7.1 EditTargets

Supplied with basICColor *DeviL* in the **EditTargets folder** are four different TIFF files for CMYK, RGB, Lab and Gray color spaces.

The motifs of a test image play a central role in the creation, control and optimization of DeviceLink profiles. They should cover all areas that are significant for the application of the DeviceLink profile. Each color space which is used in conversions requires its own relevant test image, i.e. the color spaces Gray, RGB, CMYK and possibly Lab. Test images for these color spaces are provided by DeviL (shown below).




Compilation of Photographic Motifs

The chosen photographic motifs should cover various areas such as skin tones, neutral tones, shadows, highlights and saturated colors. It is advisable to use test images which are applied industry-wide, such as the Roman16 test images of the ECI or the BVDM or images of the ISO (if available). Some of these images are included in the EditTargets provided by DeviL (for example CLEditCMYK_Large_v31_144dpi.tif). Additional images from your production enhance the significance of the test images.

Gradients

Gradients are generally a critical factor in color conversions, both when using traditional ICC device profiles for source and target or when using DeviceLink profiles. The Homann Smoothness Inspection gradient test form is intended for the assessment of possible breaks or artifacts. It is included in the test file CLEditCMYK_Large_v31_144dpi.tif.

Pure CMY Colors

The test image should also have pure colors in various shades, particularly for CMYK-to-CMYK conversions. They should be positioned at the edge of the test image and should be large enough to allow direct comparison and measurement before and after conversion. This is important on proofs, for the use of colorimeters or the eyedropper tool in Photoshop.

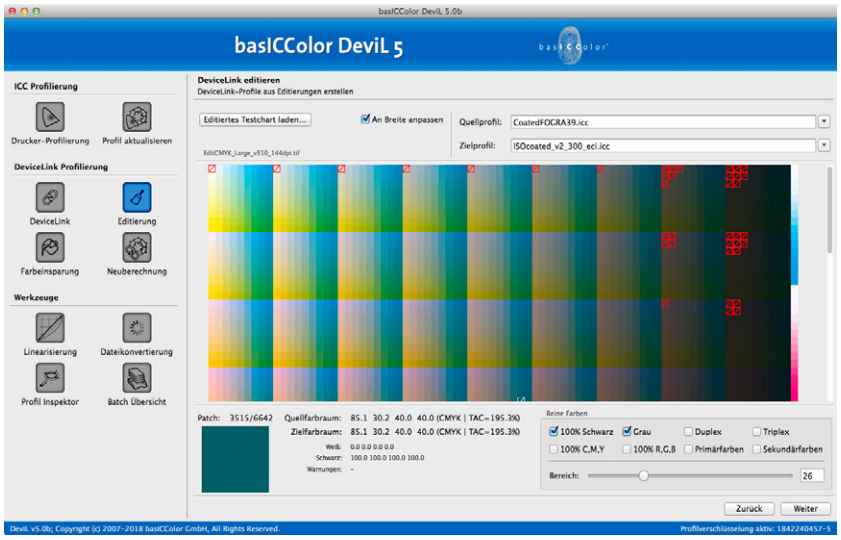
Note: *Since version 3* basICColor *DeviL supports the Photoshop PSD format and so it is also possible to edit Duplex (two color channels) and Triplex (three color channels) via* ***Editing****.*
As basICColor *DeviL identifies the original edit chart via the identification color patches, the color space of the converted edit chart is irrelevant.* basICColor *DeviL can also transform color conversions into DeviceLink profiles that include a change of color space, e.g. from RGB to Gray, Gray to RGB or RGB to CMYK. Needless to say, DeviceLink profiles can also be created that merely involve a color correction without a change of color space (e.g. CMYK to CMYK or Lab to Lab for creating abstract profiles).*

7.2 How to create DeviceLink profiles with edited charts

To incorporate any desired color transformation into a DeviceLink profile, like global corrections or selective color corrections, this color transformation has initially to be integrated into the selected EditTarget using an image editing software (for example Adobe Photoshop).

Open the desired test chart (EditTarget) in your image editing software in the appropriate color space (the color space from which the color conversion will be performed). The provided EditTargets can be found in the EditTargets folder (Windows: C:/Program Files(x86)/basICColor DeviL5/EditTargets and in macOS: Applications/basICColor DeviL5/EditTargets). When you have modified the EditTarget and saved it under a new name, open it in the tool **Editing**, either by drag and drop or by using the button **Select Edited Testchart**.

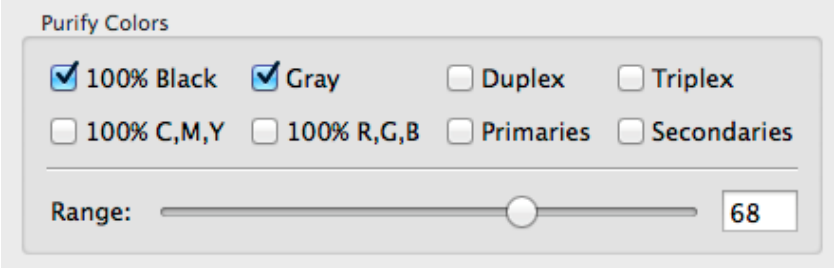
If a profile is embedded in the opened EditTarget, it will automatically be selected as target color space. The source profile has to be selected manually. If there is no embedded profile, the source and the target profile can be assigned manually. Assigning profiles is useful as color patches will then be displayed with true colors in DeviL as well. A further advantage of edited DeviceLinks with assigned source and target profiles is that this profile information is stored in the PSID tag of the profile, so it can be used by intelligent workflow solutions like the color server ZePrA to automatically create configurations.



***Note**: All profile drop-down menus function like search fields. Simply type in some letters of the desired profile and only those profiles containing these letters will be shown in the list. To select a profile simply click on it. Alternatively, you may open the drop-down menu with the little arrow on the right and select a profile from the full list as usual.*
You can now assess the modifications for each color patch. Here, the original unedited EditTarget is used as a reference. The reference value of each color patch is located in the upper left half of the diagonally split color patch, the edited value is in the right lower half. If you move the mouse pointer over the chart, the color patches will be displayed along with other color information including a difference display in parentheses (color space and TAC value).

Purify Colors

In contrast to the exceptions in conventional DeviceLink profiling, the exceptions under Purify Colors in the tool Editing ensure that any contamination caused by editing of the test chart will be removed but not recalculated. Among other things, these exception rules define how pure colors, colors, gray, duplex and triplex colors are structured in the DeviceLink. The selection of these rules considerably determines the quality of your DeviceLink profile.
All color patches that are affected by the selected exception will be highlighted in the graphical representation by a red border. If you move the mouse pointer over a color patch it is emphasized by a black or white border and the values of the source and target color space are displayed. By pressing the 'Alt' key on your keyboard the color patch will be captured allowing you to check quickly and easily whether and to what extent it is affected by an exception. Exceptions which are not available are grayed out. This may be the case when a dependency between exceptions exists, or when exceptions are not relevant for a specific color space.



100% Black: Protects 100% black, so 100% K remains 100% K and will not be supplemented with or replaced by CMY. Additional color portions will be deleted.
For a conversion of an RGB source profile into a CMYK target color space **100% Black** ensures that an RGB value of 0, 0, 0 is converted to 100% black. For example, it prevents pure black RGB text from being composed of four colors in the CMYK profile after the conversion.

Gray: Protects the single color structure of black from 0 to 100%. Additional color portions will be deleted.

Duplex (a primary color plus black): Prevents color contaminations of duplex colors. If editing of the test chart caused contaminations of duplex colors by adding primary colors, these impurities will be removed.

Triplex (two primary colors plus black): Prevents color contaminations of triplex colors. If editing of the test chart caused contaminations of triplex colors by adding primary colors, these impurities will be removed.

100% C,M,Y: Protects cyan, magenta and yellow. The 100% values of C, M and Y are retained after the color conversion at 100%. Additional color portions will be deleted.
The slider **Range** specifies how far adjacent color patches are included.

100% R,G,B: Protects pure red, green and blue. The 100% key values of red, green and blue are retained after the color conversion at 100%.
The slider **Range** specifies how far adjacent color patches are included.

Primaries: Protects the single color structure of primary colors.

Secondaries: Protects the two color structure of secondaries.

Range: The slider **Range** allows to specify how far adjacent color patches will be included. All color patches that are affected by the selected exception are highlighted in the graphical representation by a red border showing the color areas which are affected immediately after moving the slider. Move the slider to a high value to avoid hard edges, move it to a low value to increase color accuracy.

Once you have set all your parameters, click “Next” to get to the “Profile Settings” window. Please refer to chapter 3 “Profile Settings” of this manual for the available options.

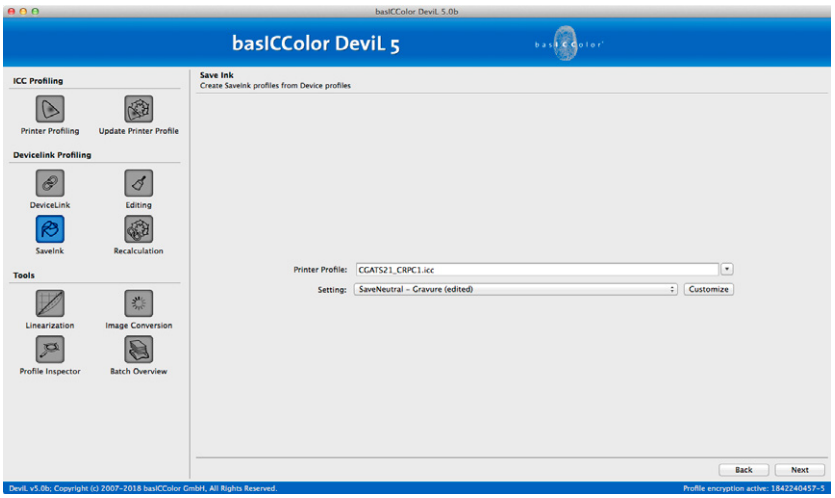
Chapter 8

SaveInk

8. SaveInk

An important application of DeviceLink profiles is ink saving while maintaining the visual color appearance. Today, SaveInk profiling (sometimes referred to as ink optimization) is a popular application for saving ink and enhancing quality in standardized offset, gravure and newspaper printing. Its application in large-format printing is interesting and should be evaluated for cutting the cost of ink consumption.

Note: The tool SaveInk requires a SaveInk license.



Open **SaveInk Profiling** by clicking the **<SaveInk>** button in the left task menu of basICColor *DeviL*:

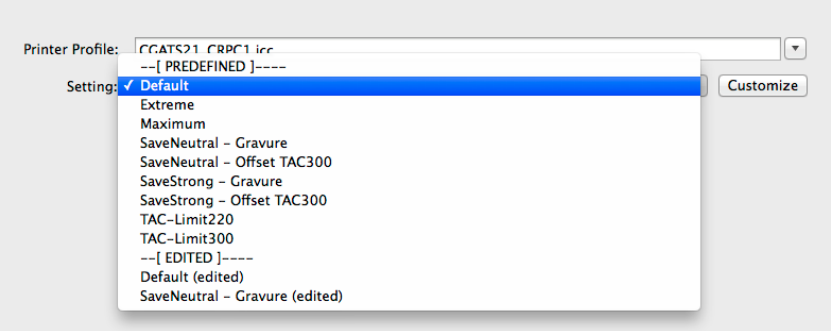
- In the **SaveInk** module, select the **<Printer Profile>** to apply ink saving..
- Under **Setting,** choose a predefined setting for the SaveInk calculation.
- If necessary, click ***<Customize>*** and change the settings for the profile.
- Click on the **<Next>** button to go to the Save dialog.
- Create the DeviceLink-profile.

8.1 Selecting a Profile and a Setting

Open the tool **SaveInk** and select the printer profile to use for the creation of a SaveInk profile.

***Note**: All profile drop-down menus function like search fields. Simply type in some letters of the desired profile and only those profiles containing these letters will be shown in the list. To select a profile simply click on it.*
Alternatively open the drop-down menu with the little arrow on the right and select a profile from the full list as usual.

Select a predefined **Setting** for the SaveInk calculation from the drop-down menu.



Default: Use this setting as a starting point, if other presets are not suitable for your print process.

Extreme: Highest ink saving, but with slight visual flaws to the original.

> ***Note**: This preset may reduce Secondaries, Duplex and Triplex colors if ink can be saved. If you explicitly want to maintain 200% inks for red, green and blue tones, you should use the slider to reduce the dE-Tolerance instead.*

Maximum: Maximum color savings with colorimetric accuracy still very high while maintaining the visual color impression. The colorimetric accuracy is best with a dE-Tolerance of 0. This setting requires experienced printers and an excellent command of the standardization.

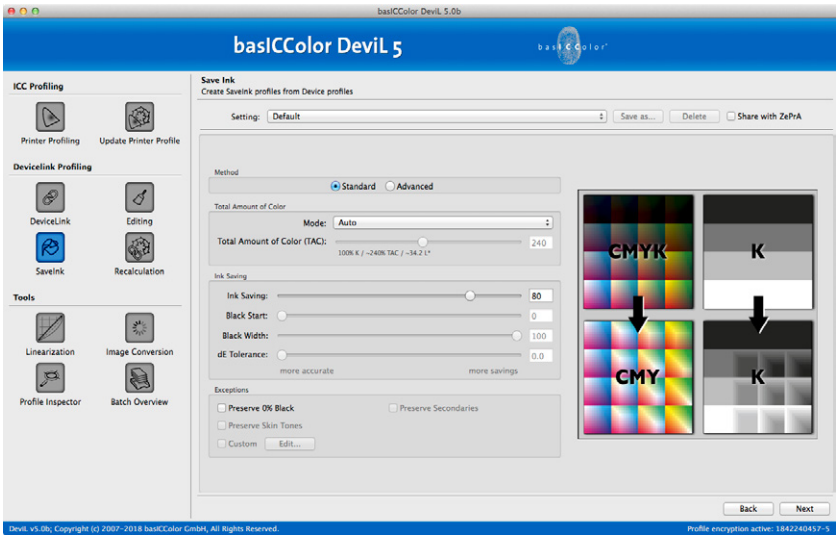
SaveNeutral Gravure – SaveNeutral Offset TAC 300: Use these settings for gravure or offset printing. These settings moderately increase the black content in neutral color areas. This is ideal for print shops who are looking for a quick introduction to saving ink and want to gain practical experience. These profiles are mainly used to stabilize the printing process and are less suitable for saving ink.

SaveStrong Gravure – SaveStrong Offset TAC 300: Use these settings for gravure or offset printing. They greatly increase the proportion of black and are aimed at printers who have their printing process under control according to the standardization and who want to achieve high ink savings, but still want to leave room for adjustments on the press.

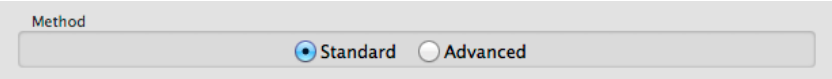
TAC-Limit300 – TAC-Limit220: TAC-Limit profiles do not perform any color conversion and limit only the total amount of color without strongly interfering with the color composition. Use **TAC-Limit300** for offset printing and **TAC-Limit220** for newspaper printing, for example.

Customize allows you to specify the **Method**, the **Total Amount of Color**, the **Ink Saving** and to define **Exceptions**.

8.2 Customizing SaveInk Settings



8.2.1 Method

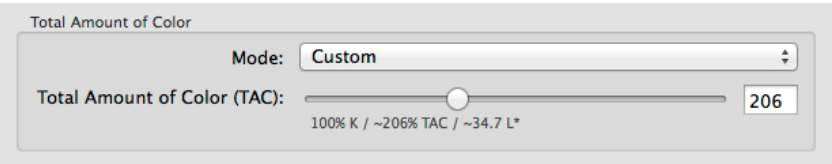


Standard: Reduces the settings a user needs to define to a minimum but still achieves economical high quality profiles. Only three settings have to be adjusted: the **Total Amount of Color**, the **Ink Saving** slider and the exception **Preserve 0% Black**. Use this method to get quick results.

Advanced: Allows the user to also define **Black Start, Black Width** and **Exceptions**. Use this method to define more precisely how the ink saving performs. When selecting the same settings as in the standard method it will produce identical results.

8.2.2 Total Amount of Color for SaveInk Profiles

The feature **Total Amount of Color** allows the tonal value limit to be set for your SaveInk profile. Print data which are converted using the SaveInk profile will be limited to the total area coverage set in the profile. The maximum black value is controlled and adjusted automatically.



Use **Mode** to specify whether the total area coverage and the maximum black value are to be adopted from the **Profile**, will be defined manually using **Custom** or will be calculated automatically using **Auto**. The maximum black value, the total area coverage and the darkest L* value will be calculated according to the selected method and will be displayed after a short processing. These values reveal, for example, whether a reduction of the total area coverage will result in brightening of the shadows. Brightening can be identified by an increase of the L* value.

Notes:

1. In most cases, the mode Auto produces the best results. Assuming the printer profile allows it, it will calculate a slight reduction of the total area coverage without increasing the L value significantly.*

*2. When using the methods **Maximum** or **Extreme** while strongly reducing the total area coverage as well, an identical Lab measurement mapping is possible only to a limited extent.*
*3. If the **TAC** is below 200% the exception Preserve Secondaries is available.*

8.2.3 Ink Saving

Ink Saving: Defines the replacement of composite black (CMY) by pure black. The higher the slider setting, the more colored ink is replaced by pure black. So higher slider settings achieve higher ink savings, but at the expense of the colorimetric accuracy.

Black Start: Defines the starting point for the replacement of composite black (CMY) by pure black. Pure black will be used above the entered value.

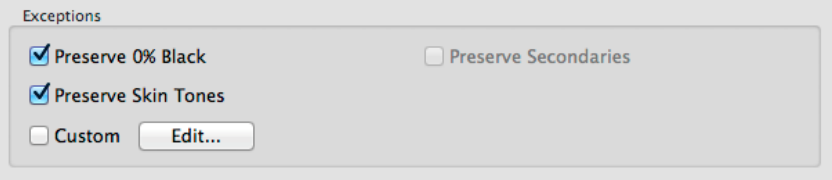
Black Width: Defines the range in which black is used outside the color-neutral area. The higher the value, the more black will be used outside the color-neutral area.

dE Tolerance: Allows tremendous ink savings when set to a high dE tolerance. Increases the maximum deltaE between the original profile and the SaveInk DeviceLink profile which results in greater ink savings. In contrast, the predefined settings **SaveNeutral, SaveStrong** and Maximum use a low dE tolerance setting of 0 deltaE ensuring a very high color and visual accuracy of the profile. However if greater ink savings are desired it can only be done by reducing the visual accuracy, hence a higher dE tolerance setting is required. The ink saving preset **Extreme** uses a high dE tolerance.

> ***Note**: Users can save on ink even more by using a higher dE tolerance setting. We recommend to test ink saving profiles with high dE tolerance settings closely before using them in production.*

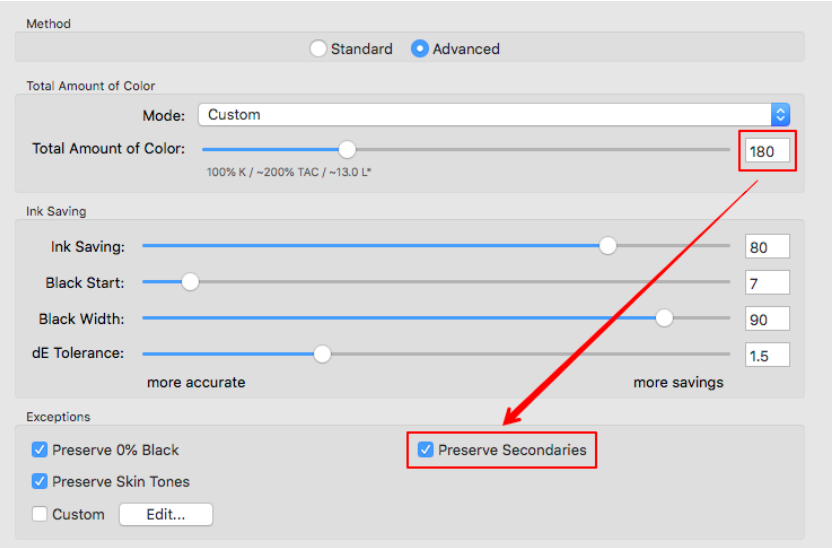
8.2.4 Exceptions in SaveInk Profiling

Exceptions define the colors to be excluded from ink saving when creating SaveInk profiles.



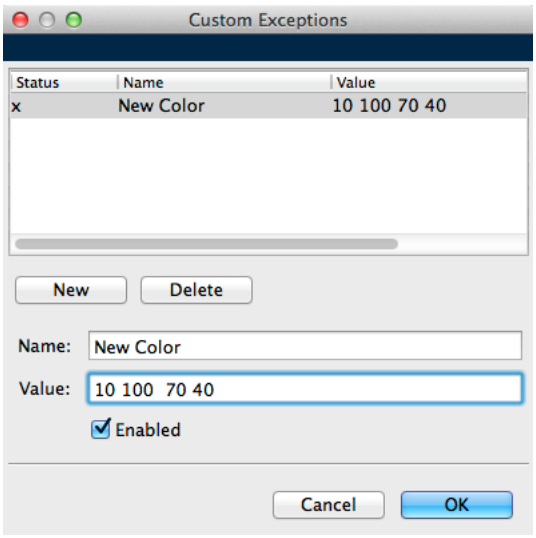
Preserve 0% Black: Areas which are built with CMY only (without black) remain unchanged by the SaveInk optimization. This is particularly important when overprinting with CMY colors but results in a considerably reduced ink saving.

Preserve Secondaries: Is only available when the total area coverage (TAC) is set to values below 200%. It allows to obtain highly saturated secondary colors without reduction, although the total area coverage is reduced below 200%.
There is a tendency in current newspaper printing and high-speed InkJet printing to use a TAC of less than 200%. This may result in an unwanted reduction of secondary colors (those who need at least 200% ink) and thus result in washed out colors. Total area coverages over 200% always preserve secondary colors, however, without this exception a reduction below 200% would also reduce red, green and blue tones. This can be avoided by activating this exception as it ensures that full red, green and blue tones remain unchanged while the TAC of dark colors and of the black point is deceased below the set total area coverage of 200%.



Preserve Skin Tones: Excludes skin tones from ink saving. This is an approach especially important for printing systems with coarse raster frequencies (for example, large format InkJet systems with low resolution, newspaper printing or printing processes subject to the 'Missing Dot' problem) to reduce the so called peppering effect, visual graying or troubled skin tones.

Custom: Specify individual CMYK color values to be excluded from ink saving. These could include specific company colors or corporate identity colors that must remain unchanged. Select Edit to open a window where the CMYK color values can be entered that will be excluded from the SaveInk optimization.



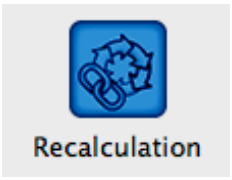
Define Custom Exceptions:

- **New** creates an entry for a new color.
- Under **Value**, enter the CMYK value to be excluded from SaveInk conversion. Optionally, assign a name for this color.
- Enter as many colors as required.
- Activate the checkbox **Enabled** to select the colors to be excluded.
- Click **OK** to confirm these values.
- Make sure to enable the checkbox **Custom**.

Once you have set all your parameters, click "Next" to get to the "Profile Settings" window. Please refer to chapter 3 "Profile Settings" of this manual for the available options.

Chapter 9

Recalculation

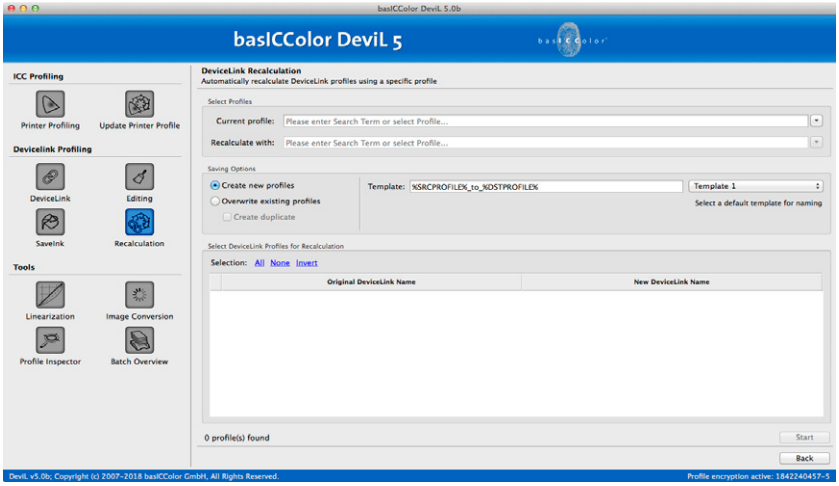


9. Recalculation

If multiple DeviceLinks need to be adapted to new profiles or if multiple DeviceLink profile combinations emerge, the module **Recalculate** is an effective tool to save time.

This function is especially useful when an optimized printer profile based on a reference profile has been created using the **Printer Profiling** tool Update Profile, and all existing DeviceLinks based on that reference profile have to be adapted to the new optimized profile.

DeviL uses the settings of the original DeviceLink profile for recalculation and replaces a current profile with a new source or destination profile



9.1 Recalculation of DeviceLinks

- Select the profile to be replaced with a new profile in the drop-down menu **Current profile** of the panel **Select profile.** Select the new profile in the drop-down menu **Recalculate with**.

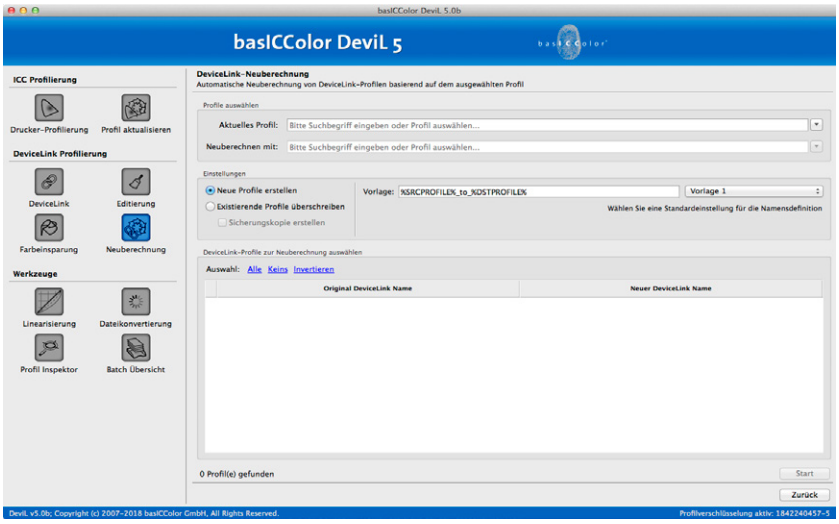
***Note**: All profile drop-down menus function like search fields. Simply type in some letters of the desired profile and only those profiles containing these letters will be shown in the list. To select a profile simply click on it.*
Alternatively, you may open the drop-down menu with the little arrow on the right and select a profile from the full list as usual.
*In **Saving Options** specify to **Create new** (DeviceLink) **profiles** or **Overwrite existing profiles**.*
*When overwriting existing profiles we strongly recommend backing up the existing profiles. To create a backup copy activate the checkbox **Create duplicate** and define a filename in the text box **Template**.*

- In **Saving Options** specify to **Create new** (DeviceLink) **profiles** or **Overwrite existing profiles.**

Note**: When overwriting existing profiles we strongly recommend backing up the existing profiles. To create a backup copy activate the checkbox **Create duplicate** and define a filename in the text box **Template

- The name of recalculated DeviceLink profiles and the backup copies (if applicable) can be defined in the text box **Template**. Either select one of the two predefined templates in the drop-down menu, or define the name in the text box **Template**.

***Note**: When moving the mouse pointer over the drop-down menu, a tooltip with descriptions of available keywords appears. Simply enter the desired keywords in the text box **Template**. All keywords must be parenthesized with a percent sign %. The resulting name will immediately be displayed in the column **New DeviceLink Name** and can be corrected in the text box **Template** if necessary.*



- All DeviceLink profiles based on the currently selected profile are listed on the left in the column Original **Device-Link Name.** The column **New DeviceLink Name** shows the resulting name of the recalculated DeviceLink profile.

- Select the DeviceLinks to be recalculated by activating the relevant checkboxes in the table. By default, all checkboxes are activated. Checkboxes can be activated or disabled with **All, None** and **Invert**. We recommend selecting the profiles to be recalculated and disable the checkboxes of other profiles.

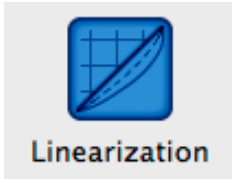
***Note**: DeviceLinks which would produce errors will be highlighted in red in the table. Errors occur when the source or target profiles are not available. The check boxes of these profiles are deactivated automatically to avoid error messages during the recalculation.*

- Select all DeviceLinks to be recalculated and, after naming, click the **Start** button to **Recalculate**.

***Note**: Right clicking on a row displays a context menu which shows the complete path to the profile location which helps to find the newly created profile.*

Chapter 10

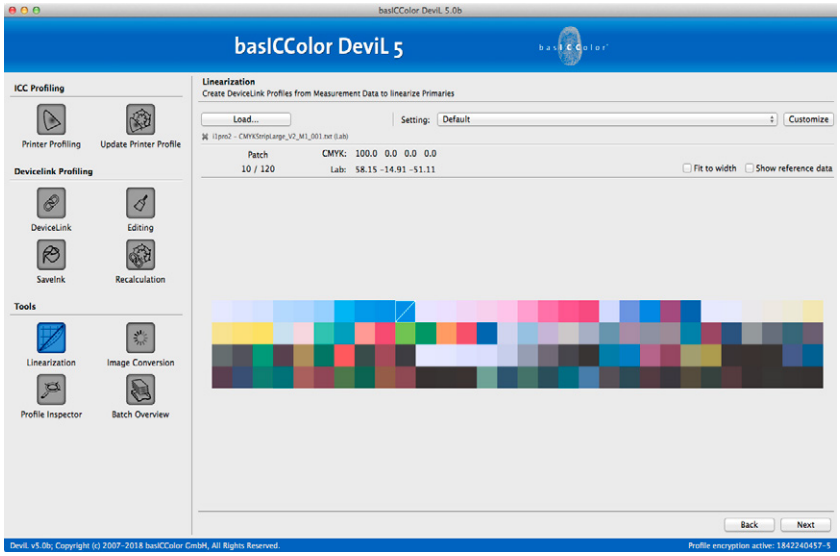
Linearization



10. Linearization

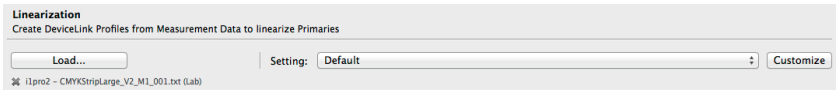
The Linearization tool optimizes the tone values of primary gradation ramps for any printer and color combination including Multicolor. The goal of Linearization is for adequate differences from white to 100% of primary inks, to smooth gradation curves and to bring primary colors to a defined and reproducible state.

The linearization methods of this tool are based on ISO 20654, basICColor's proven default calibration method or G7 calibration. It also provides a setting to protect the highlights which is important for Flexo printers and G7 calibration of difficult media and printers. All settings can be used for CMYK and Multicolor measurement data and there is a setting which allows the use of G7 for the CYMK parts of Multicolor data and ISO 20654 for the additional colors as G7 is only intended for CMYK.

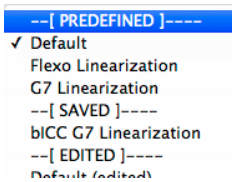


10.1 Measure and Load Data

Linearizing a DeviceLink starts with printing a linearization test chart on the uncalibrated printer without color management. Then measure the test chart with basICColor catch.
If required, you can optimize the measurement data with suitable software, such as basICColor ImProve. Now Load the measurement data in DeviL.



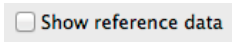
Load: Opens and displays existing measurement data files. Alternatively, drag and drop the data into the window, to extract and view the data.



Setting: Select the linearization method. DeviL contains three **[PREDEFINED]** settings **(Default, Flexo Linearization, G7 Linearization)**. These settings can be **[EDITED]** and **[SAVED].**

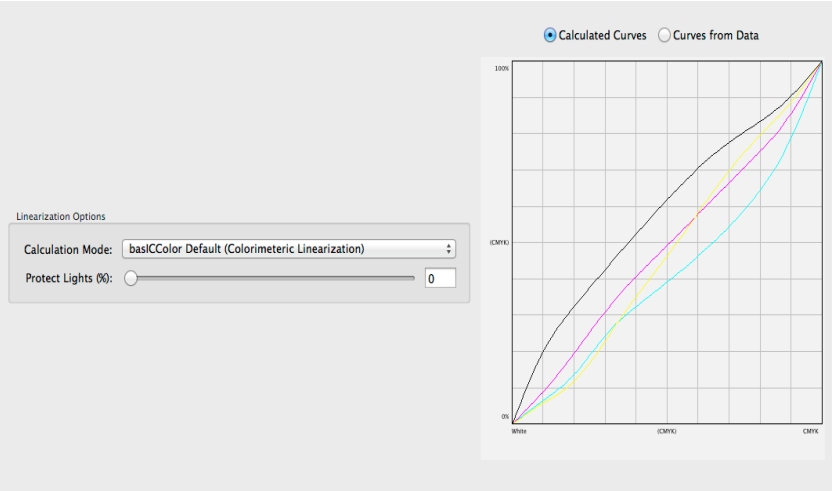
Customize: Allows fine tuning of the linearization setting by selecting the **Calculation Mode** and adjusting the **Protect Lights (%).**

Fit to Width: Fits the color patches of a row to the window width. Especially for large test charts with very many color patches and many rows the color patches will be displayed larger.

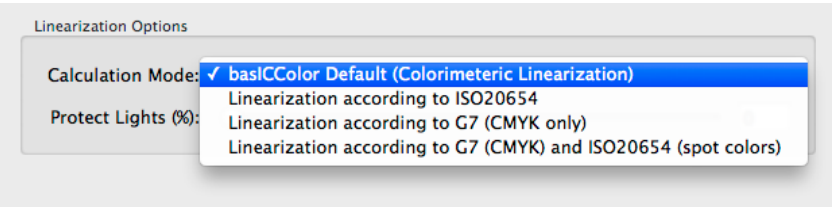


Show reference data: The device values such as CMYK or RGB and measurement data (i.e. Lab or spectral values) are shown on a split color patch. The data can be quickly compared for incorrect or faulty data.

10.2 Linearization Options



Calculation Mode: This setting defines the method to calculate the colorimetric linearity. Four standard methods are available which can be customized and saved.



basICColor Default (colorimetric linearization): Linearizes the curves based on Lab/dE-76 which means that a 50% value of a primary has the same distance to the left (white) as to the right (full tone) and is therefore located at the midpoint of the graphic.

Linearization according to ISO 20654: Linearizes the tone values of primary gradation ramps based on linearity according to ISO 20654.

> ***Note**: The methods **basICColor Default** and **Linearization according to ISO 20654** are very similar. However, in contrast to the ISO 20654 approach, **basICColor Default** takes the hue of primaries into consideration.*

Linearization according to G7 (CMYK only): The CMYK tone value curves are linearized to match the gray balance requirements of the G7 calibration process. Additional Multicolor channels are not affected.

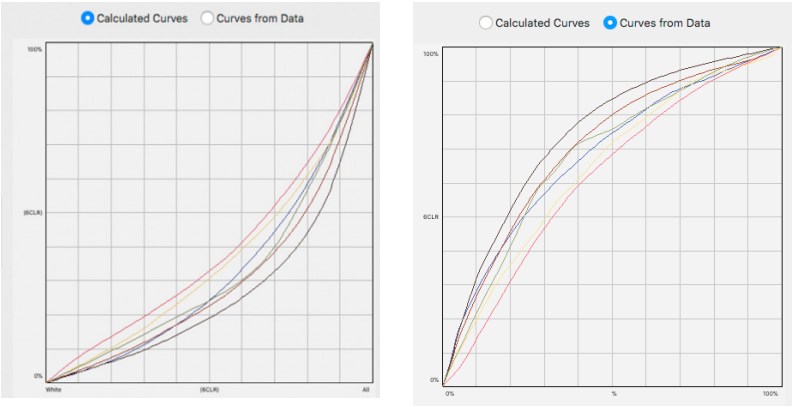
Linearization according to G7 (CMYK) and ISO 20654 (spot colors): G7 is defined to work with CMYK only. The additional Multicolor channels are not affected. Therefore, activating this setting applies the G7 procedure to the CMYK parts of a Multicolor measurement file and the ISO 20654-based method to the remaining Multicolor channels.

Protect Lights (%): Protects highlight areas. Values below the set percentage are protected and will not be linearized. Make sure to get a smooth transition from the protected – non-linearized – highlights to the linearized part of the measurement data.

> ***Note**: For linearization of the entire measurement data, set the slider to 0. The curves graphic allows assessment of the linearization results based on the selected settings. Use the two radio buttons to compare the Calculated Curves – which will lead to a linear behaviour of the printer when applied – to the original CMYK and Multicolor curves (Curves from Data).*

Calculated Curves: Represent the curves based on the selected settings that will be applied in the resulting Linearization DeviceLink profile.

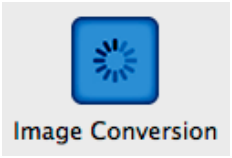
Curves from Data: Shows the original non-linearized curves. The graph is a colorimetric representation of the curves according to ISO 20654. Linear curves indicate a printer in a perfectly calibrated state according to ISO 20654.



Once you have set all your parameters, click "**Next**" to get to the "Profile Settings" window. Please refer to chapter 3 "Profile Settings" of this manual for the available options.

Chapter 11

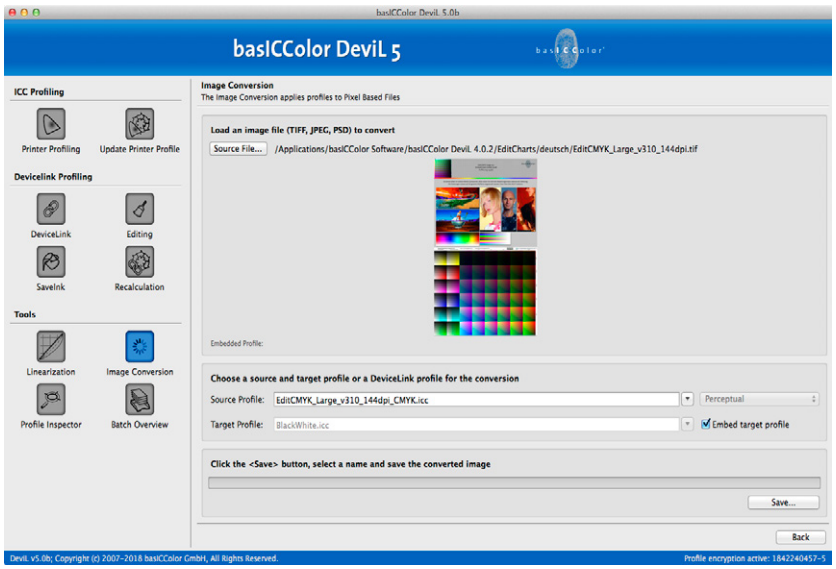
Image Conversion



11. Image Conversion

basICColor *DeviL* converts PSD, TIFF and JPEG files with the help of ICC device profiles and DeviceLink profiles. This function is very useful for checking the profile quality on images, since typical application programs do often not support all types of DeviceLink (i.e. RGB to CMYK) or multicolor profiles.

If you are using a *DeviL* trial license (demo license), the application will allow the conversion of images with the demo profiles for further evaluation in other programs (i.e. Photoshop).

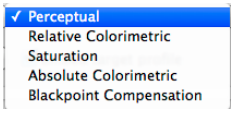


Note: Demo-DeviceLink-Profiles

The image conversion supports coded and with the basICColor DeviL demo version created demo profiles. This way, you can evaluate the profile quality from either coded or demo profiles when converting images. In order for other applications to correctly display the converted files, basICColor DeviL will decode a coded or demo profile and embed it with a smaller grid size into the converted image.

Note, however, that you cannot use this profile for production purpose, because the profile quality is reduced. For this reason, such profiles are marked as LOW QUALITY VERSION FOR DEMO ONLY in the file name

After selecting an image (TIFF, JPEG or PSD), which is to be color converted, both a preview of the image as well as a possibly embedded profile is displayed.



You may choose to apply either a normal ICC conversion with source and target profile or a DeviceLink conversion. By the information of the embedded profile, you know that you should select this profile as your **<Source Profile>**. If you would like a DeviceLink conversion, you know which source profile your DeviceLink should have.
In a normal ICC conversion from the source to the target profile, you will be able to specify the rendering intent for the conversion. Besides the typical four ICC rendering intents, a fifth option **Blackpoint Compensation** is available.

Note: *It is the relative colorimetric intent with additional black compensation, as it is also known from Adobe Photoshop.*

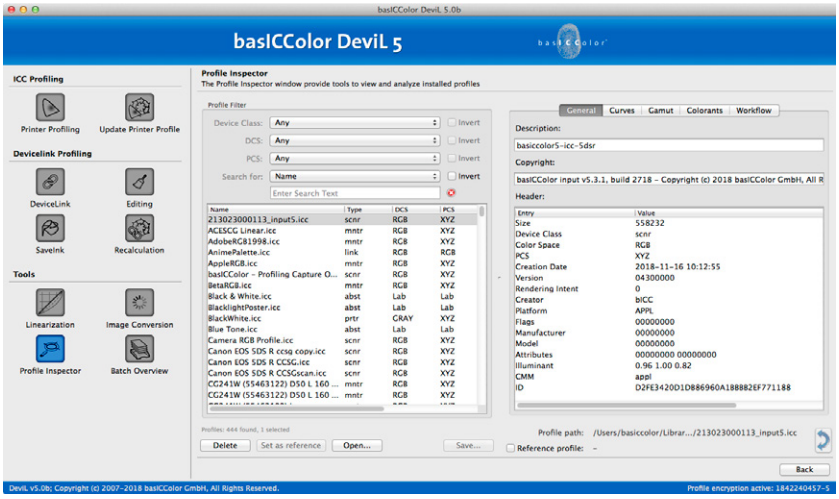
Want a DeviceLink conversion to perform? Just select the desired DeviceLink profile from the drop-down menu of the **<Source Profile>**. Other options, such as the choice of the target profile or a rendering intent, are no longer necessary. These options are disabled accordingly.

Chapter12

Profile Inspector

12. Profile Inspector

Since version 4 basICColor DeviL features the **Profile Inspector**. You can manage, sort, analyze, compare and adapt your profiles without having to leave the basICColor *DeviL* working environment. The main window of the **Profile Inspector** shows you all on your computer available profiles. All sorts of profiles can be handled (including DeviceLink- and MultiColor profiles) and therefore make the **Profile Inspector** the ultimative tool for all color-management requirements.



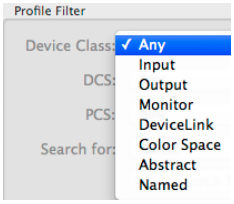
Profile Inspector includes 5 different tabs (**General, Curves, Gamut, Colorants, Workflow**) which provide access to all important functions. Apart from that, it allows to quickly and comprehensively verify the quality of profiles by means of a **Profile Report.**

12.1 Profile Selection

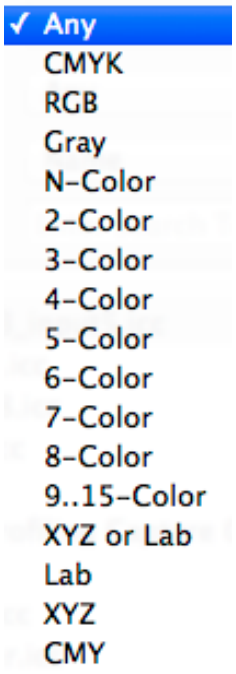
The left side of the **Profile Inspector** window is divided into three areas:

12.1.1 Filter

Offers various filters for searching profiles and a profile list showing all available profiles on your system.
Using the four drop-down menus and the text input box narrows down the search to find profiles more quickly.

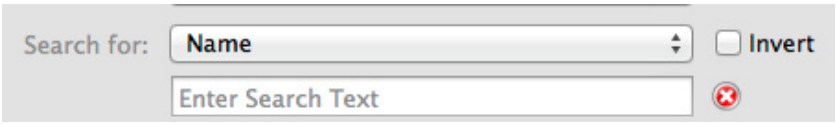


Device Class: Displays all profiles of a specific device class. You can exclusively display Input (scnr), Output (prtr), Monitor (mntr), DeviceLink (link), Color Space (spac), Abstract (abst) or Named (nmcl) profiles.



DCS and **PCS**: With **DCS** (Device Color Space) and **PCS** (Profile Connection Space) all profiles of a specific color space can be viewed.

Search for: Enter a search term to search specifically for a particular text in the profile name. For example, by entering 'preview' all preview profiles are shown. Searching for Name, Manufacturer, Creator, Date, System Profiles, Updated Profiles or Correction DeviceLinks is also possible. Narrowing down the search to a specific date can be useful to display all profiles that have been created on a given day.

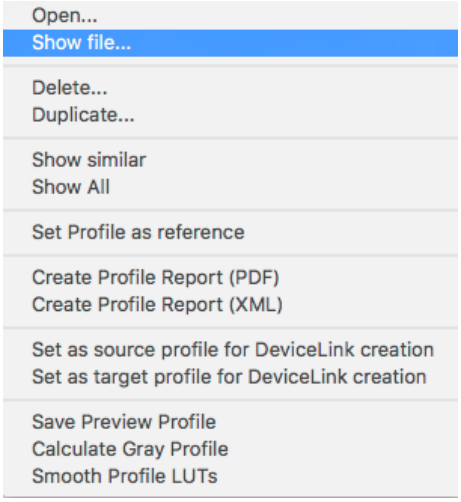


Invert: All filters and keywords can be inverted by clicking on the corresponding checkbox. For example, by selecting DeviceLink under Device Class, all DeviceLink profiles will be shown. By activating the checkbox Invert, all profiles except DeviceLink profiles will be shown.

A click on X resets all filters and displays all profiles

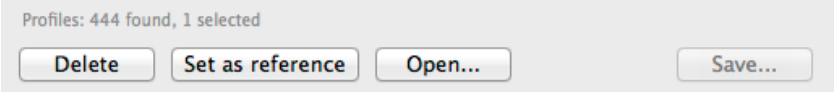
12.1.2 Profile List

The list of available profiles is updated automatically every time the program is accessed (at program start or whenever it is brought to the foreground).
A right-click on a profile opens a context menu. The following options are available (depending on the profile type):



The entries ***Create Profile Report (PDF)/(XML), Save Preview Profile, Calculate Gray Profile and Smooth Profile LUTs*** are only available if a valid license for the corresponding modules exists.

12.1.3 Operation buttons.



- **Delete**: Deletes the selected profile.

- **Set as reference:** The selected profile is used as reference profile for a gamut comparison with another profile. It is displayed at the right bottom of the window under Reference profile and can be activated or deactivated by its checkbox. After activation it is available for a Gamut Comparison (see below) and will be shown in the 3D and 2D view of the gamut together with the selected profile. To view only the selected profile, hide the reference profile by unticking the checkbox.

- **Open (macOS):** Opens the ICC profile using the default system program. macOS opens the ColorSync Utility which displays individual tags and tables of the selected profile.
- **Show file (Windows):** Opens the folder in which the selected profile is stored.

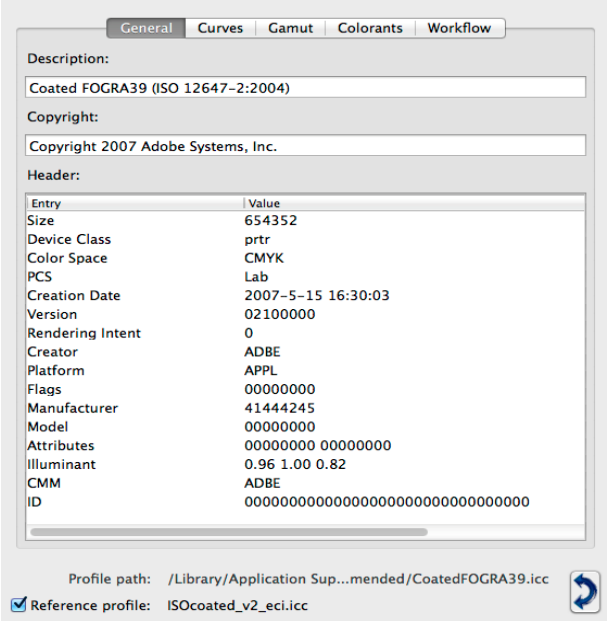
- **Save:** Saves any changes to a given profile.

12.2 Functions of the main area

At the very top of the main window of the **Profile Inspector** are five tabs that give you the following options:

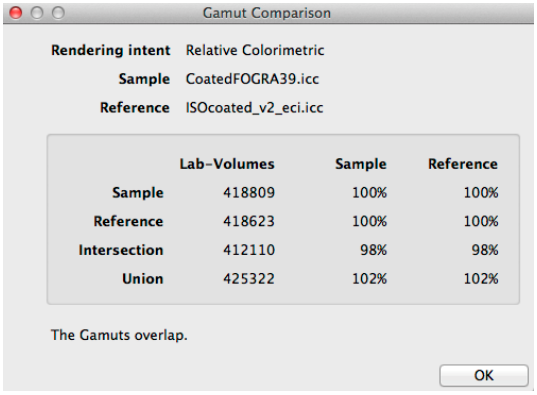
12.2.1 General

The **General** tab is divided into three sections: **Description** (here, a new internal name for the profile can be defined, which will automatically be saved when you go back to select another profile), **Copyright** (the corresponding "non-editable" Copyright of the profile) and **Header** (shows all the relevant entries from the profile header).



Gamut Comparison

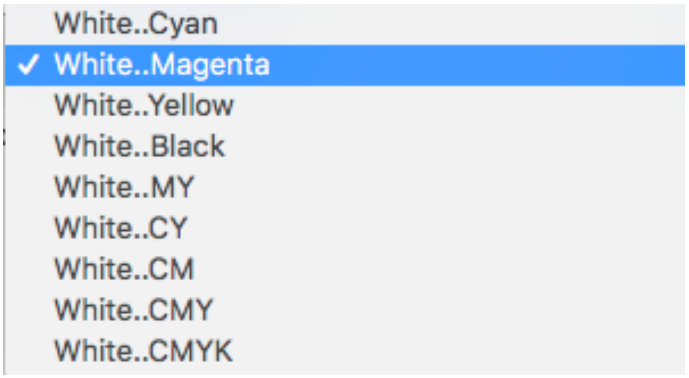
A **Gamut Comparison** can be created by clicking on the double arrow icon at the bottom right of the window (see screenshot). In this process the gamut size of the selected profile is calculated and compared to the gamut size of the selected **Reference profile** (see above). The selected profile is displayed under **Profile path.**



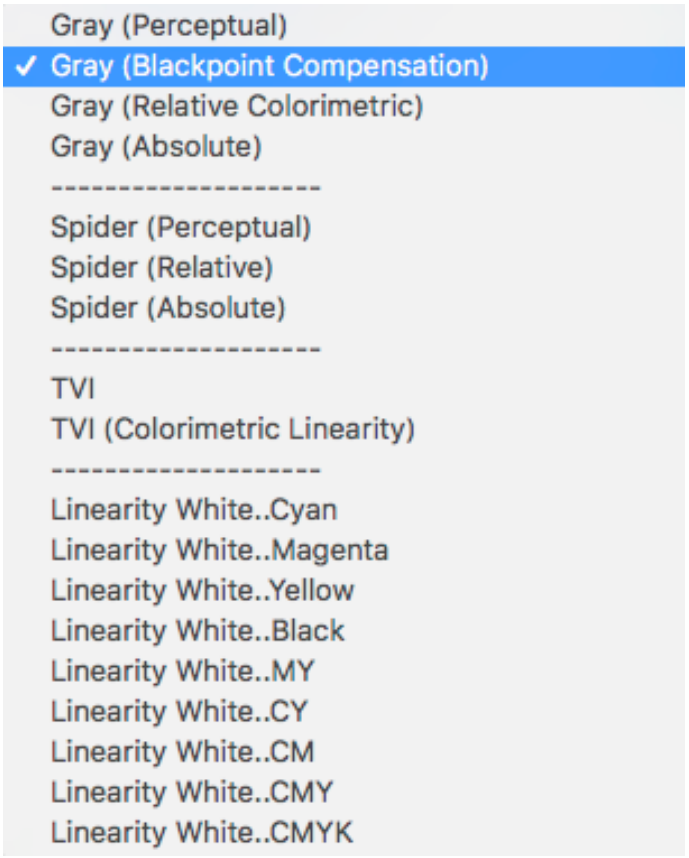
12.2.2 Curves

Shows the curves for the selected profile. For each Device Class only the appropriate options are available in the drop-down menu, e.g. for DeviceLinks, device profiles or monitor profiles (see screenshots).

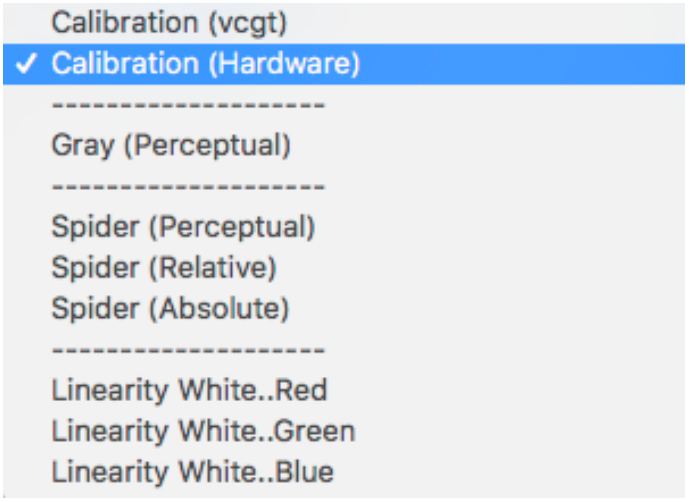
Dropdown for DeviceLink profiles:



Dropdown for device profiles:

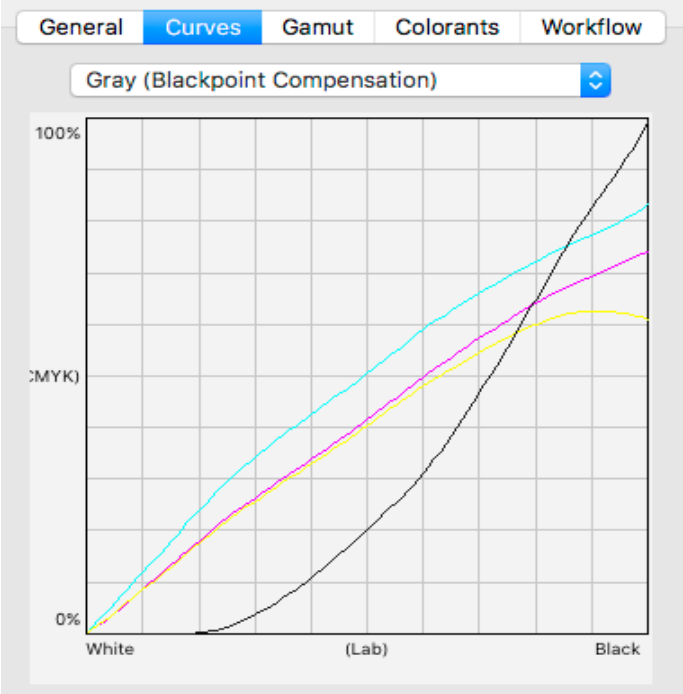


Dropdown for device profiles:



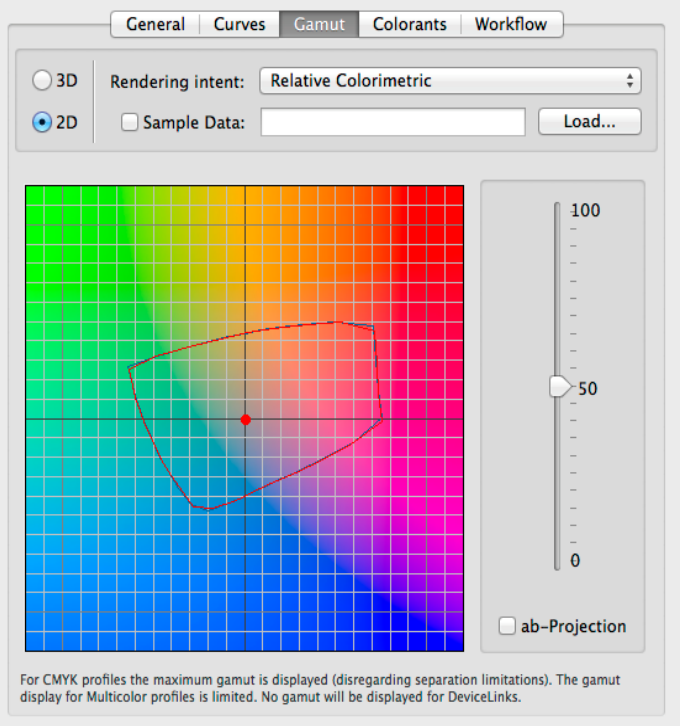
For example, the purity of the channels can be displayed for DeviceLinks. For printer profiles you can view the curves for the gray balance but many more curves and color space views are available additionally. Specific curves are available in the drop-down menu for monitor profiles. Try out the various options and curves to get an overview of the characteristics of your profiles.

A special feature of Profile Manager is the possibility to view the gray balance of a printer profile for different rendering intents in the profile. Thus the gray balance can be viewed using the relative colorimetric rendering intent with black point compensation (see screenshot).

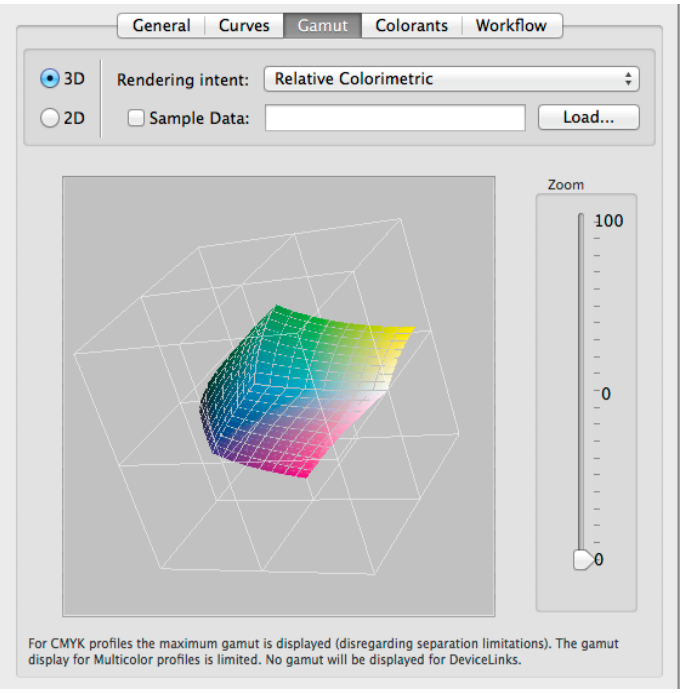


12.2.3 Gamut

The Gamut tab shows either a 2D...

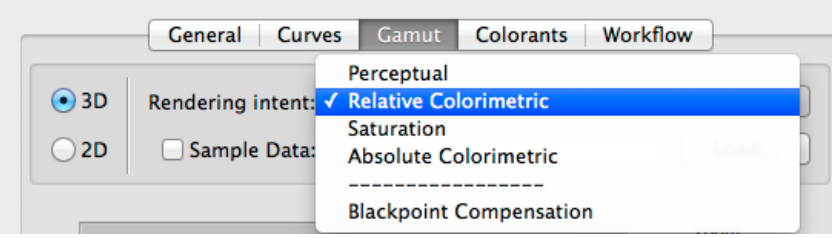


...or 3D...

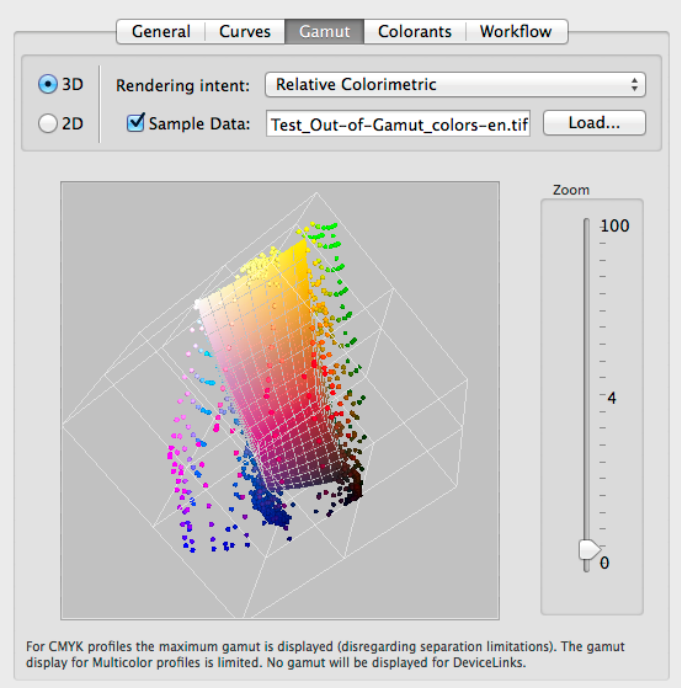


...representation of the selected profile.

The representation changes according to the selected Rendering intent.



Sample Data: Sample data can either be image files (TIFF, JPEG or PSD files) or measurement data as text files (CGATS files in text format or CxF files) or a single Lab value entered manually. Based on the position of the values in the Lab color space the **3D** or **2D** representation quickly reveals whether images or color values can be reproduced within the desired printer gamut using the set **Rendering intent**.

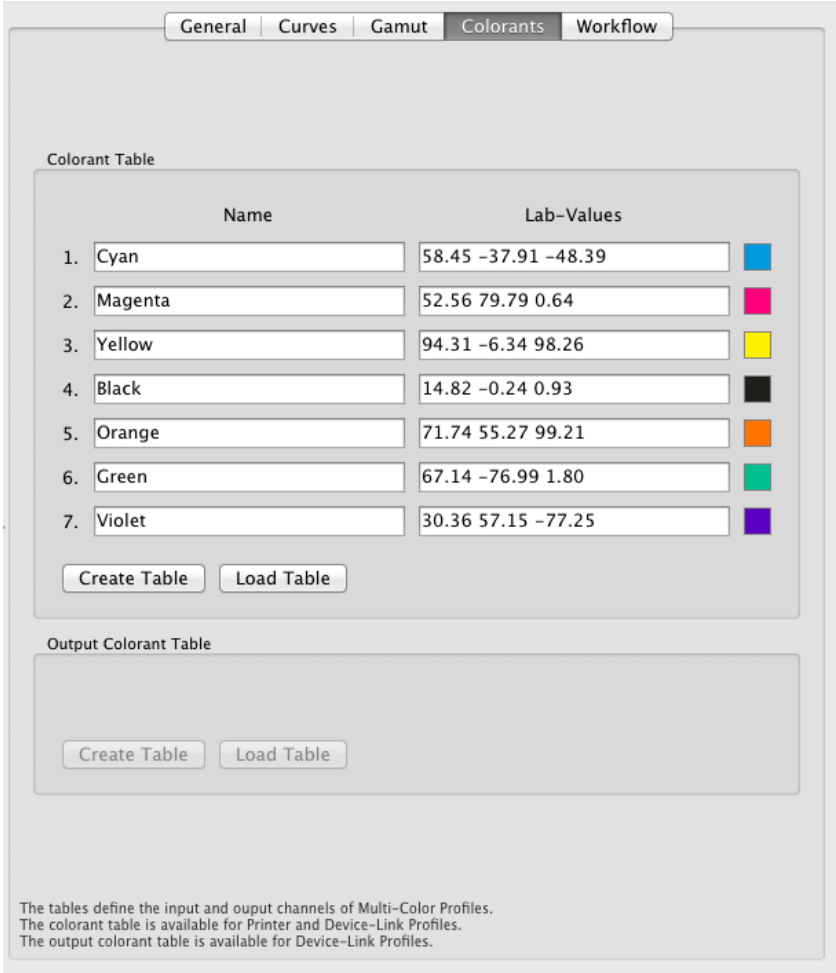


***Note**: Image files (JPEG, TIFF or PSD) will be split into color patches using a lower resolution and will then be converted directly to Lab using either the embedded profile or the default profile and the set Rendering intent. The image will be converted and displayed as dots. The selected profile is shown in brackets behind the file name. If no profile is embedded AdobeRGB is used for RGB images. CMYK images without a profile are assumed to be in the CMYK color space of the selected profile. The used color space is always shown in brackets behind the file name.*

12.2.4 Colorants

The Colorants tab shows the Colorant Table of the profile (if available, for example, for Multicolor profiles and Multicolor DeviceLinks). Both the Name and the Lab Values can be edited and saved. A small color patch at the end of each line shows the current Lab value in true colors. In addition, creating a colorant table or loading an existing table is possible.

> ***Note**: If Multicolor profiles do not list these tables correctly, it is an error in these profiles which can be corrected by using the function Create Table.*

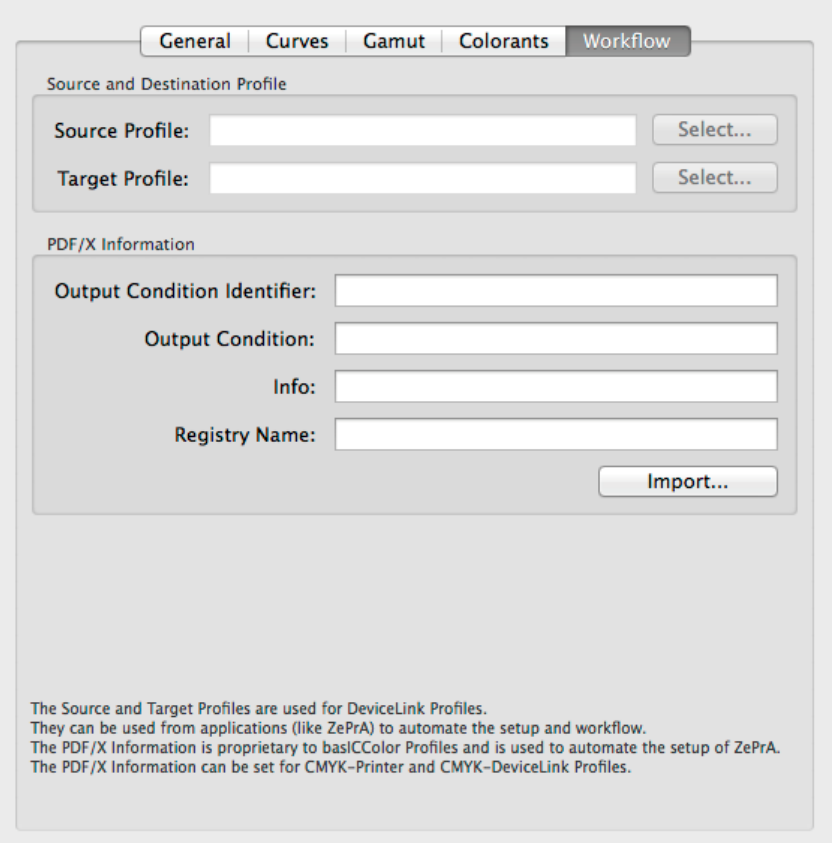


***Note**: Printer profiles only have one colorant table, DeviceLinks, however, may have up to two colorant tables (for Multicolor-to-Multicolor-DeviceLinks).*

12.2.5 Workflow

In the tab Workflow the Source and Target Profile of a DeviceLink and the PDF/X Information can automatically be entered in the profile which allows the automatic creation of configurations in the color server ZePrA. This requires the source and the target profile of the DeviceLink. ZePrA then automatically reads out the information about source and target profiles as well as the PDF/X information from the loaded DeviceLink and applies them in the configuration (PDF/X information can be entered for CMYK printer profiles or DeviceLinks).

The tab Workflow allows the user to add this information to self-created profiles. Profiles of other manufacturers can also be optimized for ZePrA's workflow.

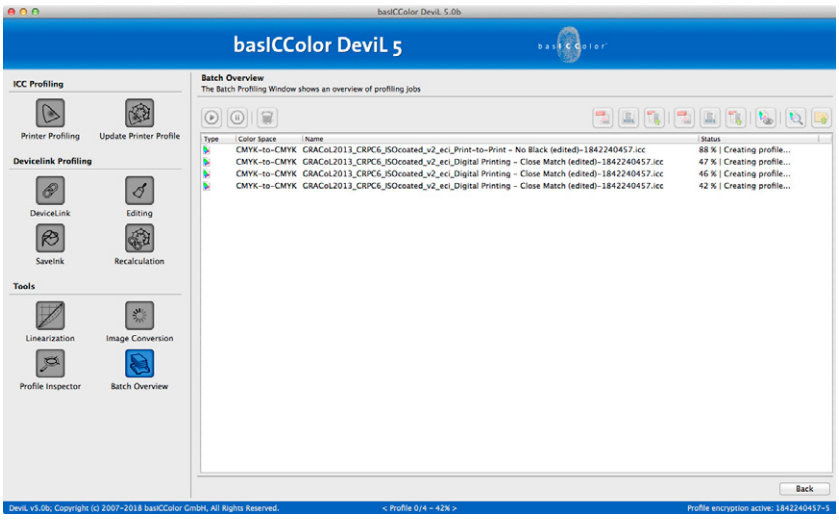


Chapter 13

Batch Overview

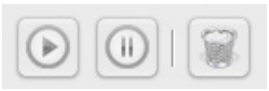
13. Batch Overview

Batch Overview enables all users to track created profiles, calculate profiles parallel and prepare further profiles in the meantime.



Advantages of using the batch processing

While the first profile is in calculation, you may set up additional profiles, which will be calculated afterwards. All profiles will be listed in the **Batch Overview** and will be calculated one after the other. This eliminates the need to wait until one profile is calculated before working on the next one..



Three buttons on the upper left of the window start or stop the calculation of profiles or remove profiles from this view.

The upper right tool set:

- PDF and XML: Create PDF or XML reports
- Open Report: Opens existing reports
- Create preview profile: Subsequently creates preview profiles
- Show in Profile Manager: The selected profile is opened directly in Profile Manager
- Show in file manager: Opens the location of the profile

The actions can also be accessed by right-clicking on a profile for a contextual menu.

The column Status displays the progress of the profile processing.

Chapter 14

Product Information

14. Product Information basICColor DeviL

Version 5.0.0, November 2018