Utilizing the Xrite eXact

Many printers have densitometers and spectrophotometers in the prepress area or press room, but often don't use them or use them to their full potential. This can be for any number of reasons, fear of measuring incorrectly, not understanding the proper order to take measurements, or where to find the function that is needed at that critical moment during a customer press check. (And what the number on the screen actually means!

This Tech Tip provides an overview of some of the most commonly needed measurement functions of the Xrite eXact spectrophotometer and how to quickly and easily use those functions. Also included at the end is a "Help!" section to guide the user to locations where more information and training are available.

Determine the Version

1. There are multiple versions of the Xrite eXact, ranging from the basic densitometer, up to the latest XP version, designed especially for measuring on film substrates. Below shows a chart describing the most common functions and differences between each device.

	Densitometer	Standard	Advanced	XP (New)
Densitometry	X	X	X	X
Lighting Conditions M0,M1,M2,M3	X	X	X	Only M0, M1, M2
DeltaE Methods		X	X	X
CIE L*a*b* / LCH		X	X	X
Pantone +		X	X	X
Metamerism			X	X
Opacity			X	X

2. Also listed below is a chart of the available aperture sizes. Selecting the right aperture at the time of purchase is important, as it is expensive to modify later.

Aperture Size	Measurement Area Size	Opening in Target Window	Recommended Patch Size	Screening Range
1.5mm	1.5mm	3.5mm	2mm-3mm	175 lines/inch or 69 lines/cm or above
2mm	2mm	4mm	3mm-5mm	133 lines/inch or 52 lines.cm or above
4mm	4mm	6mm	5mm-7mm	65 lines/inch or 26 lines/cm or above
6mm	6mm	8mm	7mm or larger	

Configuring the Settings

Setting the proper measurement configuration prior to completing any readings is very important. Changing the settings for the lighting condition, observer angle, or other settings can make the same printed color measure with different results. Below is a list of the options within the General Settings menu. For those instances where the customer has not defined the parameter, we have highlighted the recommendations for the G7 specification. If providing measurements as part of an analysis, these values should be documented.

Why are there so many choices? General Settings may change by region (North America and Europe are usually slightly different) and specific brand owners may require a particular setting for their work.

1. General Settings

Values highlighted with a purple diamond are the G7 recommendations and may be used when there is no provided specification. Always document the General Settings used for future reference and communication.

    a. Measurement Condition – select the correct lighting condition.
        i. M0 = Illuminant A
        ii. M1 = Includes equal amounts of UV and visible light
        iii. M2 = UV Cut – standard illumination but filters UV light
        iv. M3 = Polarization

For more information on measurement conditions, see: http://www.xrite.com/documents/literature/en/l7-510_m_factor_en.pdf

    b. Illuminant Observer – There are many different lighting conditions ranging from incandescent to daylight to fluorescent. Observers in the D category are generally recommended for printing applications.
        i. D50 is most commonly used in North America.
        ii. Europe may rely on D65 condition.
        iii. The 2-degree observer angle most used in flexo printing.

    c. Density Status – This is an ANSI definition of the filters used for measurement.
        i. In North America, Status T (wide band) is generally selected.
        ii. Europe often uses the Status E response.

    d. Density White Base – Should the paper be included in the measurement, or subtracted?
        i. Generally, density measurements will be higher if the paper is included in the density measurement. This measurement type is called "Absolute".
        ii. Selecting "Paper" will require a measurement of the base paper substrate prior to taking any measurements. The measurement of the paper will be subtracted from the overall density measurement.
        iii. How do you decide which to select? There are different theories to which White Base to use, but the most important point is that only values with the same settings are compared to each other. It is common to refer to a density measurement or target as "Absolute" or "Minus Paper".

    e. Density Precision – The number of decimal places shown on the results display.

2. Function Settings

    a. Tone Value settings should generally be set to use the Murray-Davies formula. Murray-Davies includes optical dot gain in the measurement.

    b. Yule-Nielsen is also an option, but will provide a measurement more related to physical dot gain.
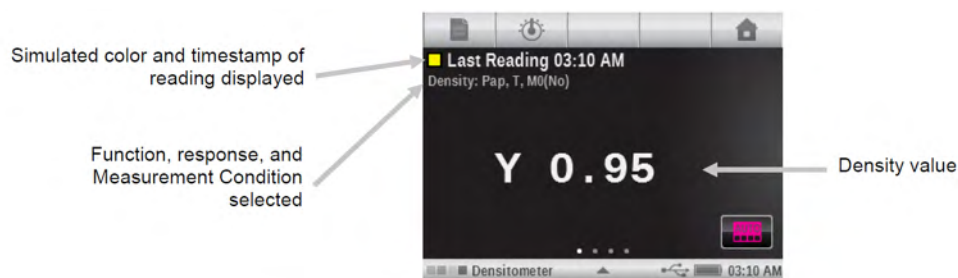
Measuring Density

On the eXact menu screen, the Density function is located on the second page of the "Home" selections. Select "Basic Tool", then tap the triangle icon at the bottom center of the screen to set the desired active functions.

    a. To take a measurement, place the aperture over the color patch, close the clam shell and wait for the beep. The reading will be displayed on the screen.

Density Measurement
Displays density values for the selected function and color.
1. Select Density, Density Trend, or All Densities.
2. Measure paper if required.
3. Select color.
4. Measure sample.
5. View data.

Simulated color and timestamp of reading displayed

Function, response, and Measurement Condition selected

Last Reading 03:10 AM
Density: Pap, T, M0(No)

Y 0.95

Density value

Densitometer   03:10 AM

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Measuring for Neutral Density

If the goal is to measure neutral density for G7, the target densities will be defined based on the L*a*b* values of the target CRPC set.

1. For example, to achieve a relative neutral density for the CRPC-6 2013 set, the following density values should be set as the target:

    a. K 25% target = 0.22   CMY Build 25% target = 0.25

    b. K 50% target = 0.49   CMY Build 50% target = 0.54

    c. K 75% target = 0.89   CMY Build 75% target = 0.91

2. Utilizing the CMY Balance function can help operators to achieve a neutral density when measuring CMY overprints.

    a. This feature allows the user to see if colors are balanced or dominant in the CMY tint blend.

    b. See the excerpt from the eXact manual.

CMY Balance Measurement

1. Select CMY Balance function.

2. Measure paper if required.

3. Measure the grey balance standard.

4. Measure sample.

5. View data.
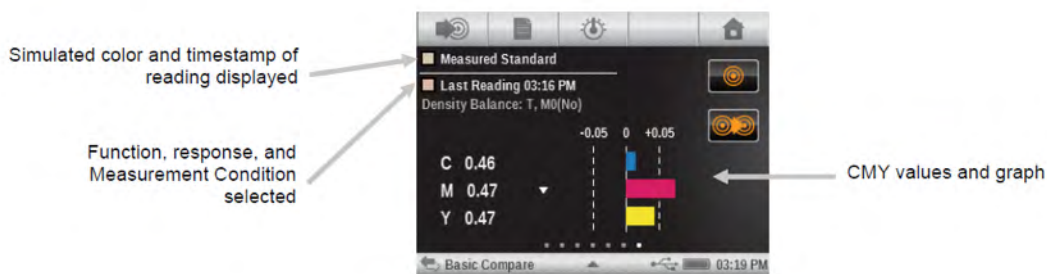
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Measuring Dot Area / TVI

1. In the Home menu area, select the Tone Value function

2. Select the paper icon in the upper left hand corner to measure the base substrate.

    a. Place the eXact aperture on the non-printed area of the sample and measure to set the paper value.

3. Measure the solid ink density (100%) of the ink color. This is used as a total value reference for the other dot percentages.

4. Measure the tint values of the same ink color and record.

    a. Software is available to assist in recording density, dot values, and other data for each job for reporting/scorecarding and future reference.

    b. For more information, contact techteam@andvre.com.

5. See the image below for details on working with the eXact interface for dot area.

Tone Value (dot area) Measurement

Displays tone value for the selected color. The procedure requires one solid and one tint measurement.

1. Select Tone Value function.

2. Select Color option if required.

3. Measure paper. Once paper is measured, it is not required until there is a new substrate.

4. Measure solid patch.

5. Measure tint patch that corresponds to the measured solid.

6. View tone value data for the tint patch.

7. Continue with additional tint patches that correspond to the measured solid, or touch the solid patch on the left of the screen and measure another solid patch.

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Measuring Color Information (L*a*b*/Lch)

To measure color information or measure the difference in color between 2 samples, it is required to have an eXact other than the Densitometer version.

1. In order to understand L*a*b* (or Lch) values, it is helpful to reference the color wheel below:
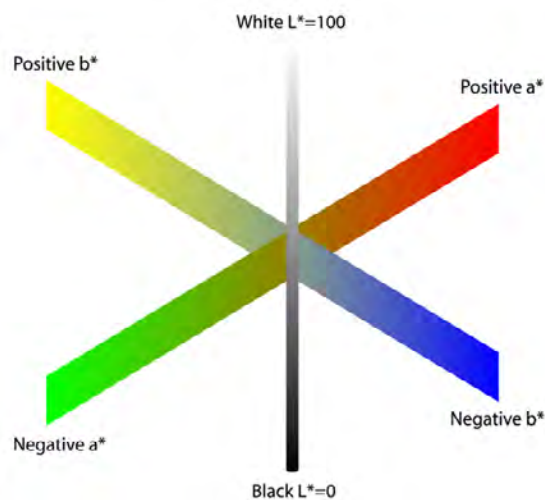
2. Each color will have a coordinate of 3 values. L*: Lightness, a*: the scale of green to red, and b*: the scale of yellow to blue.

3. A target color will be communicated using these 3 values.

   a. For example, the L*a*b* values of a solid Cyan sample when targeting G7 with the CRPC-6 2013 should be:
      i. L = 56
      ii. a = -37
      iii. b = -50

4. On the eXact, the Colorimetric Measurement function is found and selected the same way as the Density function. On the second page of the "Home" selections. Select "Basic Tool", then tap the triangle icon at the bottom center of the screen to set the desired active functions.

Colormetric Measurement

Displays colorimetric measurement data for the selected function.

1. Select L*a*b*, L*C*hº, XYZ or Yxy colorimetric function.

2. Measure sample.

3. View data.
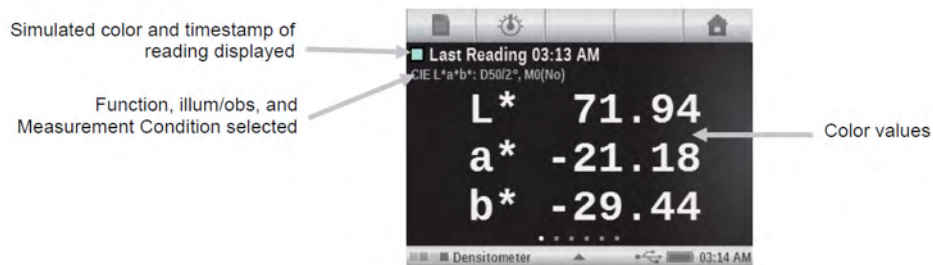
*From Page 37 of the
eXact User Guide*

Comparing 2 Colors

It is also very convenient on the eXact to compare 2 different colors without saving any data.
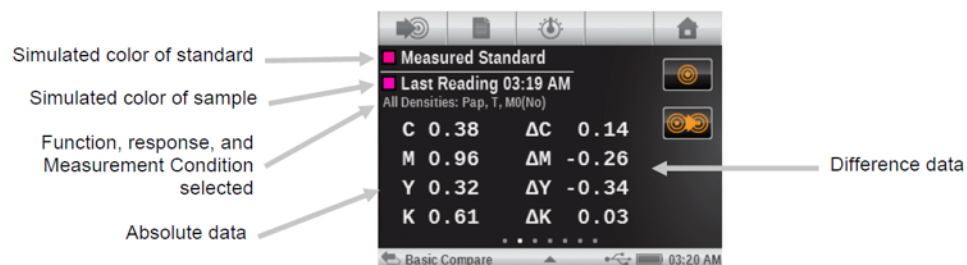
Basic Compare Measurement

1. Tap the Compare Tool icon to access the measurement screen.

2. Tap the Measure Standard icon to access the standard screen.
3. Measure the standard.
4. Tap the Back icon to return to the measurement screen.

5. Tap the Paper icon and measure paper if required.
6. Tap the Function icon and select the function to use for comparison.
7. Measure the sample for comparison.
8. View measurement results.

Simulated color of standard — Measured Standard
Simulated color of sample — Last Reading 03:19 AM
All Densities: Pap, T, M0(No)
Function, response, and — C 0.38   ΔC 0.14
Measurement Condition — M 0.96   ΔM -0.26   — Difference data
selected — Y 0.32   ΔY -0.34
Absolute data — K 0.61   ΔK 0.03
Basic Compare   03:20 AM

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Help Section

Need more information? Here is a list of references and tools available to Xrite eXact users:

1. Online training is available for clients who purchase an eXact device. Please see: http://www.xrite.com/xrite-eXact/training

   - Check out the FREE tutorials about the eXact functionality.
   - This site also contains Xrite certification programs.
   - The training session "Going Beyond Density" a $159 value, is free with an eXact purchase.

2. Updating Pantone Library

   - The digital versions of the standard Pantone libraries are available for download for use with the eXact.
   - Special libraries are available for purchase on the website.

3. Calibration

   - This device will calibrate periodically when needed. A notification will appear on screen to initiate the process. The with calibration plaque is included within the device – no more searching for the white/black chip/plaque!

4. Below is a chart identifying the icon functions on the Xrite eXact.

Navigation Bar

Measure Standard: Measure the standard.

Paper Measurement: Measure the paper white for densitometric functions.

Sheet Selection (with number): Job is in "Production Mode". Number denotes which "sheet" samples are currently stored with.

Sheet Selection: Job is in "Make Ready Mode". Sample storage is temporarily disabled.

Function Selection: Select the measurement function (e.g. Density, L*a*b*).

Job Report: View the current job report.

Home: Return the screen to the main menu.

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