Betacolor S4 XPress
High Performance Densitometer
Quick Start Guide
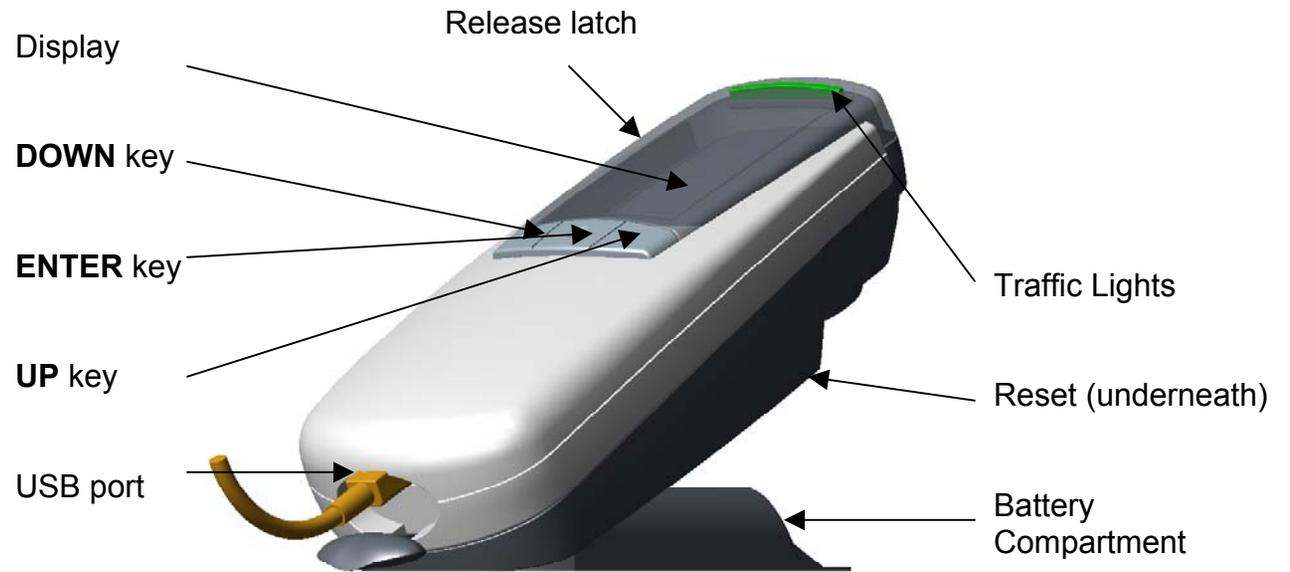Version 1.0

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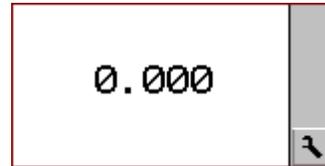Battery
Compartment

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Getting Started

There's no need to turn the S4 XPress on or off; it's always ready to use
There's no need to charge it, plug it in, or connect the cables; there are none.
There's no need to select the mode or function; it's automatic.

Zero to Paper

Place the aperture on the white paper, press the head down, watch the display.

`0.000`

Measuring the white paper always clears the screen.
It's only necessary to zero on the paper if the paper is different than the last job.
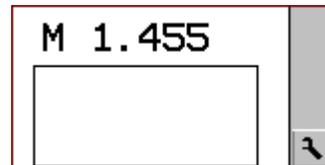If there's no ink on the paper, there's no density; it's called **RELATIVE DENSITY.**
There are other possibilities and we'll explain them later on page 10.

The measuring cycle takes less than half a second, we're ready before you are.

Measure a Solid patch

Place the aperture on a solid patch of the cyan, magenta, yellow, or black. Press the head down, watch

`M 1.455`

the display. The large **M** means you've measured the magenta control target.
Continue with the other colors in any order.
Notice the previous measurements are saved on the **HISTORY STACK.**
Measure across the sheet, notice the variations in density.

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Four measurements are saved on the HISTORY STACK. The last measurement was the solid magenta target. After any solid color patch the **DOT GAIN** targets of the same color can be measured.

```
M 1.455
    C  1.325
    Y  1.225
    K  1.625
    Y  1.225
```

Measure a Dot Gain Target

The last solid color measured was Magenta, so we can now measure a Magenta Dot Gain Target.

```
M 75%    7Δ%
    M  1.450
```
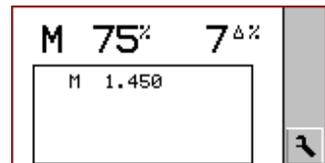
Place the aperture on the Dot Gain Target and press the head down.
The M indicates you've measured the Magenta Dot Gain Target.
The $75^{\%}$ indicates which of the three Dot Gain Targets you've measured.
The $7^{\Delta\%}$ is the result of the Dot Gain Calculation.
Δ% means **CHANGE IN PERCENT.** The 75% target is actually 82%.

This Magenta Dot Gain Target has 7 points of dot gain.
Continue measuring the other Magenta Dot Gain Targets

```
M 75%    7Δ%
    M 50%  14%
    M 25%  10%
    M  1.450
```
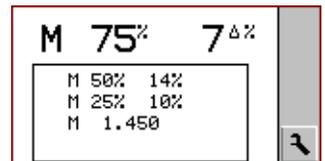
All of the Magenta Dot Gain Targets have now been measured.
The 25% Magenta Dot Gain Target has 10 points of dot gain.
The 50% Magenta Dot Gain Target has 14 points of dot gain.
You can measure any Dot Gain Target after measuring the Solid of the same color.

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Density and dot gain need to be at the correct values in order to produce a consistent and predictable result. To control the color on a job it is necessary to take at least six measurements to determine the magnitude and direction of any change.

1) Cyan density, 2) Cyan dot gain, 3) Yellow density, 4) Yellow dot gain, 5) Magenta density, 6) Magenta dot gain

Making six measurements every time just to determine if something has changed can be very time consuming, even with a densitometer as fast as the Betacolor S4 XPress.

Measure Gray Balance
The **Gray Balance Target** has halftone dots of Cyan, Magenta, and Yellow balanced to produce a neutral gray appearance.

C 1.235
M 1.455
Y 1.230

Place the aperture of the unit on the Gray Balance target and press the head down. Gray Balance Targets are automatically detected by a special sensor in the unit. The HISTORY STACK changes to a large, three line display.
The equivalent Cyan density of the Grey Balance target is 1.235.
The equivalent Magenta density of the Gray Balance target is 1.455.
The equivalent Yellow density of the Gray Balance target is 1.230.
Magenta is highlighted because it is the one farthest out of balance.

Additional Gray Balance measurements can be made in other positions on the sheet.
Each measurement produces three values and the one farthest out of balance is highlighted.
The History Stack is restored when a Density or Dot Gain measurement is made.
Balance measurements can be stored and compared as explained on page xxx.

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Measure Trapping Efficiency and Color Rotation

Printing wet ink films on top of each other requires that the inks "**TRAP**" to each other. **TRAPPING**

EFFICIENCY is a measure of how well the second ink is trapped to the first in relation to how well that ink transfers to dry paper. Low Trapping Efficiency causes red, green, or blue overprint colors to reproduce poorly. Place the aperture on a Trap target. Press the head down and watch the display. The HISTORY STACK is replaced by a group of three large color icons.

The center icon is the color of the target just measured. The left and right icons are the components of that color. Measure the two colors shown on the left and right. The result is shown below.
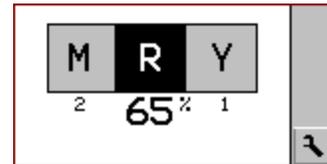
The target measured will be displayed with a gray background.
Measure the remaining color target.
The second icon will turn gray and the results will be displayed.
The unit will display the first printed color, the second printed color, and the TRAPPING EFFICIENCY.
Yellow was printed before Magenta, 65% of the Magenta trapped to the

Yellow ink compared to the paper. Repeating this procedure for the Green and Blue targets will determine the complete color rotation of the printed piece.

ZERO, Density, Dot Gain, Gray Balance, and Trapping have all been measured automatically.
No buttons were pressed, no modes were selected, no slow-down was required.
This is what AUTOMATIC means.

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Adjusting Instrument Settings

The Betacolor S4 XPress is extremely flexible, easily adapting to your work method and shop standards. Icons are used to navigate through the setting and adjustment functions.
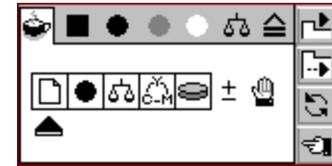
Vertical Tool Bar

This gray bar is always located along the edge of the display. The icons displayed in it are used to access additional functions and to adjust instrument settings.
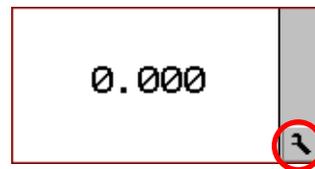
The TOOL icon leads to the SETUP menu

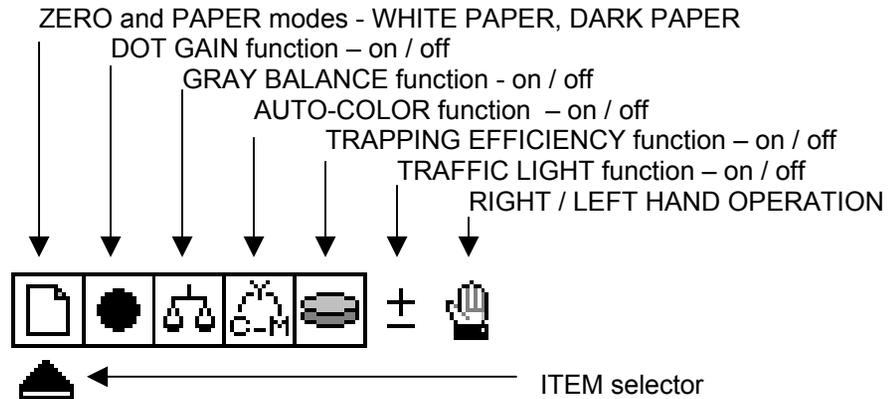The toolbar now contains icons to navigate through the SETUP screen.

- The TAB SHEET tool selects from the seven tab icons across the tops of the display

- The ITEM tool selects from the choices within the TAB SHEET currently displayed

- The CHANGE tool steps through the possible states of the selected ITEM

- The GO BACK tool returns you to the screen where you selected the TOOL icon

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AUTOMATIC Tab

This screen allows setting of the following functions

ZERO and PAPER modes - WHITE PAPER, DARK PAPER
DOT GAIN function – on / off
GRAY BALANCE function - on / off
AUTO-COLOR function – on / off
TRAPPING EFFICIENCY function – on / off
TRAFFIC LIGHT function – on / off
RIGHT / LEFT HAND OPERATION

ITEM selector

In the figure above the first five icons are ENABLED, as indicated by the FRAME, or black border around them. This means that their functions are operating. The TRAFFIC LIGHTS are not operating and the RIGHT HAND mode is active. The FRAME is used in all other menus and displays to indicate that an item is selected or active.

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Function Details

PAPER icon allows RELATIVE DENSITY or DARK PAPER mode to be selected.
Turning this function off prevents very light color samples from being mistaken for paper.

DOT GAIN icon enables automatic recognition of highlight, midtone, and shadow dot gain targets. Turning this function off causes dot gain targets to be measured as density targets

GRAY BALANCE icon allows automatic recognition of the three-color gray balance target.
Turning this function off causes gray balance targets to be measured as black tints.

AUTO COLOR icon allows automatic color filter selection of solid density targets.
Turning this function off allows the user to select the desired color channel from the main display

TRAPPING icon allows trapping efficiency and color rotation to be measured.
Turning this function off causes trap targets to be measured as primary color solids

TOLERANCE function causes the red and green signal bar to light up depending on the measured value and the values and tolerances set in the DENSITY, DOT GAIN, and BALANCE screens. Turning this function off prevents the red or green lights from being illuminated.

RIGHT HAND function causes the display to be right-side-up for right-handed users.
Selecting this icon immediately inverts the display, appropriate for left-handed users.

Customizing the Settings

The instrument comes from the factory with the most useful and common settings already in place. There may be no need to change them at all if your standard printing conditions are similar to these default settings.

If you prefer to print at different density levels, you can change the instrument to agree with your preferred shop conditions. You can also adjust the tolerance applied to your preferred density values.

You can make the same kind of changes to the dot gain target values, your preferred dot gain values, and the tolerances applied to them.

Gray balance target values and their respective tolerances can also be adjusted to suit your printing preferences.

Edit the Density Values and Tolerances
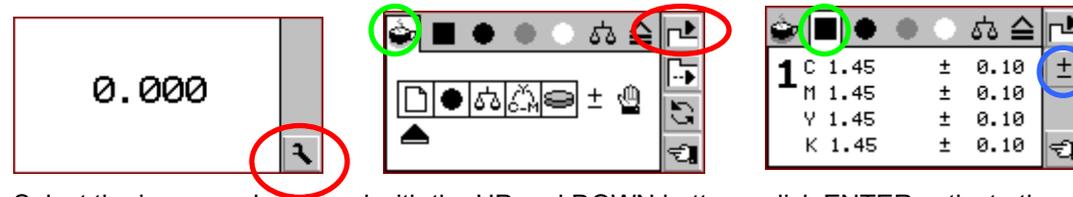
Select the icons marked in red with the UP and DOWN buttons, click ENTER activate them.
Use the TAB SHEET SELECT tool to move from the AUTO tab to the DENSITY tab marked in green.

Select the EDIT icon marked in blue with the UP and DOWN buttons, click ENTER to activate it.

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The DENSITY EDIT screen will appear. Highlight the ITEM SELECT tool marked in red by clicking the UP and DOWN buttons and activate it by clicking the ENTER button.
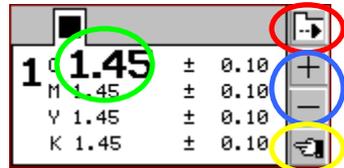
Each click of the ITEM SELECT button will advance the selection marked in green to the next field. In the left column are the densities of C, M, Y, and K solids. The right column is the allowable tolerances for these densities. Use the PLUS or MINUS icons marked in blue to raise or lower any value.

The density values can also be entered interactively by measuring a print sample with the desired density for each color. The samples can be measured in any order and the corresponding values will be updated automatically. The density tolerances are scaled automatically and may also be adjusted manually.
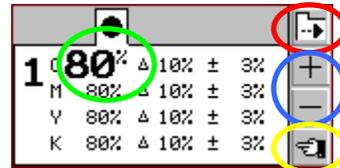
Highlight the GO BACK icon marked in yellow by clicking on the UP and DOWN buttons and activate it by clicking the ENTER button.

Edit the Dot Gain Targets, Print Values, and Tolerances

Select the icons marked in red with the UP and DOWN buttons, click ENTER activate them.
Use the TAB SHEET SELECT tool to move from the AUTO tab to the DOT GAIN tab marked in green.
Select the EDIT icon marked in blue with the UP and DOWN buttons, click ENTER to activate it.

The DOT GAIN EDIT screen will appear. Highlight the ITEM SELECT tool marked in red by clicking the UP and DOWN buttons and activate it by clicking the ENTER button.

Each click of the ITEM SELECT button will advance the selection marked in green to the next field. In the left column are the dot gain target values for C, M, Y, and K . The next column are the preferred dot gain print results. The last column is the allowable tolerances on these dot gain values. Use the PLUS or MINUS icons marked in blue to raise or lower any value.

Highlight the GO BACK icon marked in yellow by clicking on the UP and DOWN buttons and activate it by clicking the ENTER button.
Select the remaining DOT GAIN targets from the SETUP screen and repeat the editing of them accordingly.

Beta Custom Gray Balance Color Bars are supplied with the North American standard dot gain target values of 25%, 50%, and 75%. These target values are the ones most frequently used in the Americas. Set the Dot Gain target values in the Betacolor S4 XPress to agree with the dot gain targets on your color bar.
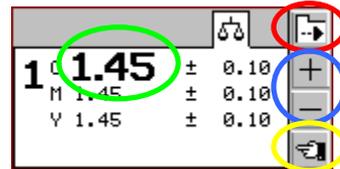
Edit the Gray Balance Values and Tolerances

Select the icons marked in red with the UP and DOWN buttons, click ENTER activate them.

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Use the TAB SHEET SELECT tool to move from the AUTO tab to the GRAY BALANCE tab marked in green. Select the EDIT icon marked in blue with the UP and DOWN buttons, click ENTER to activate it.

The GRAY BALANCE EDIT screen will appear. Highlight the ITEM SELECT tool marked in red by clicking the UP and DOWN buttons and activate it by clicking the ENTER button.
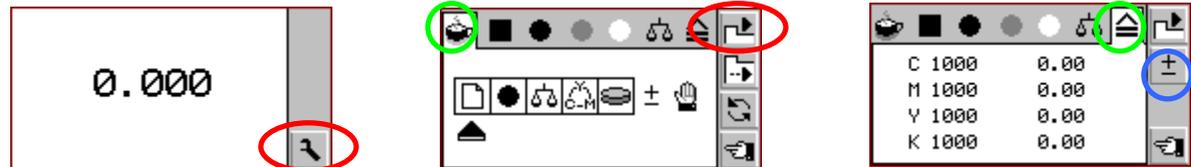

Each click of the ITEM SELECT button will advance the selection marked in green to the next field. In the left column are the gray balance values for C, M, and Y. The right column contains the allowable tolerances on these gray balance values. Use the PLUS or MINUS icons marked in blue to raise or lower any value.

Highlight the GO BACK icon marked in yellow by clicking on the UP and DOWN buttons and activate it by clicking the ENTER button.

The Betacolor S4 XPress has a unique feature not found on any color densitometer on the world market. A properly printed three-color gray balance target has the same visual appearance as a black tint of the same value. When the GRAY BALANCE tool is enabled in AUTOMATIC mode, these three color gray balance targets are automatically identified, measured, and checked against the stored values and tolerances. No operator intervention is required.

Because both density and dot gain affect gray balance targets, they are a good early warning system for detecting changes in print conditions. When they are located adjacent to a black tint, very accurate visual judgments can be made with just a quick glance. Beta Custom Gray Balance Color Bars have gray balance targets in every ink key zone, and black tints adjacent to them in every fourth zone, allowing both visual and densitometer control of the press.

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Edit the Density Slope Controls

0.000

C 1000   0.00
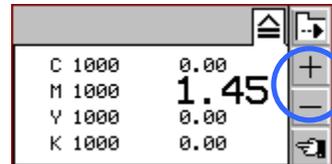M 1000   0.00
Y 1000   0.00
K 1000   0.00

Select the icons marked in red with the UP and DOWN buttons, click ENTER activate them.
Use the TAB SHEET SELECT tool to move from the AUTO tab to the SLOPE tab marked in green.
Select the EDIT icon marked in blue with the UP and DOWN buttons, click ENTER to activate it.

The SLOPE CONTROL edit screen will appear. Highlight the ITEM SELECT tool marked in red by clicking the UP and DOWN buttons and activate it by clicking the ENTER button. Each click of the ITEM SELECT button will advance the selection marked in green to the next field. In the left column are the density slope values for C, M, Y, and K. The right column contains the density values at which the slope controls were adjusted. Use the PLUS or MINUS icons marked in blue to raise or lower the slope values for each channel as needed.

C 1000   0.00
M 1000   0.00
Y 1000   0.00
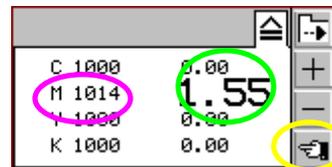K 1000   0.00

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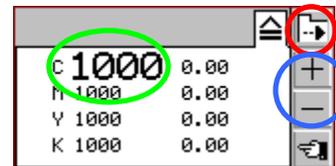
The slope values can also be adjusted interactively by measuring a sample with a known density for each color. The samples can be measured in any order and the corresponding values will be updated automatically.

In this case a magenta sample was measured and produced a density value of 1.45. The sample is marked 1.55 and you'd like to make the instrument agree with that. Press the UP or DOWN buttons to highlight the editing keys marked in blue.

Each press of the ENTER key will raise the displayed density value by 0.01 marked in green. The corresponding increase in the density slope factor will be calculated and displayed automatically in the left column marked in magenta.

This technique can be useful where you want to adjust the Betacolor S4 XPress to **match** the readings of another instrument, even though those readings may not be **correct**. When you want to return the instrument to the correct values, you can do so be adjusting the slope values in the left column back to 1000, or the value that originally appeared in the display.

Highlight the GO BACK icon marked in yellow by clicking on the UP and DOWN buttons and activate it by clicking the ENTER button.

Advanced Features and Options

Several features make the Betacolor S4 XPress more productive and easier to use than any other instrument.

Working with the Traffic Lights

A unique feature of the Betacolor S4 XPress is the TRAFFIC LIGHT at the front of the unit. This indicator helps the operator determine if a density, dot gain, or gray balance target is in or out of tolerance. It eliminates the need to memorize the OK sheet conditions, or do mental arithmetic with every measurement to verify if it is within acceptable limits.

The unit also comes preloaded with standard print values on gloss coated, matte coated, and uncoated paper. One reference channel can be edited and programmed with your own preferred density, dot gain, and gray balance conditions.

Selecting the TRAFFIC LIGHT function also allows you to choose which one of the print condition charts will be used for comparison.

Highlight the SETUP icon marked in red and press ENTER to open the SETUP screen.
Highlight the TAB ITEM icon marked in blue to move the ITEM SELECTOR marked in green to the TRAFFIC LIGHT icon marked in yellow.
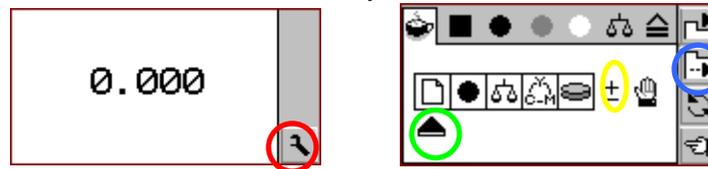
Click the ENTER button to move the ITEM SELECTOR under the TRAFFIC LIGHT icon marked in yellow.
Highlight the CHANGE TOOL marked in red to step through the available selections, stopping on option #1.
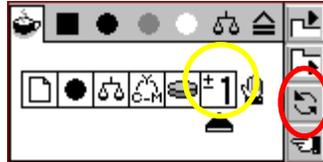
All density, dot gain, and gray balance measurements will now be compared to the values stored in reference channel #1. Measured values that fall within the tolerances will cause the TRAFFIC LIGHT to flash green. Values that exceed the tolerances will cause the lights to flash red.
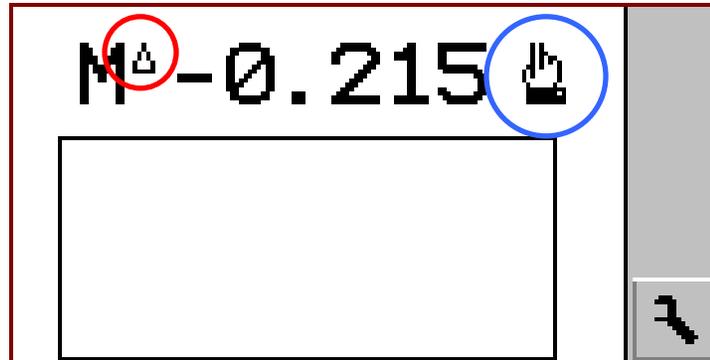
This sample screen shows the result of a magenta solid measurement with the traffic light feature enabled.

The delta symbol marked in red indicates that this is a traffic light measurement.

The negative value indicates that this is the amount by which the density is too low and out of tolerance.

The guide pointer marked in blue indicates that the density must be increased. The operator must increase the ink feed to that zone.

Subsequent density measurements are placed in the history stack as shown below.

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Out of tolerance density values in the stack are surrounded by a gray rectangle as marked in red.
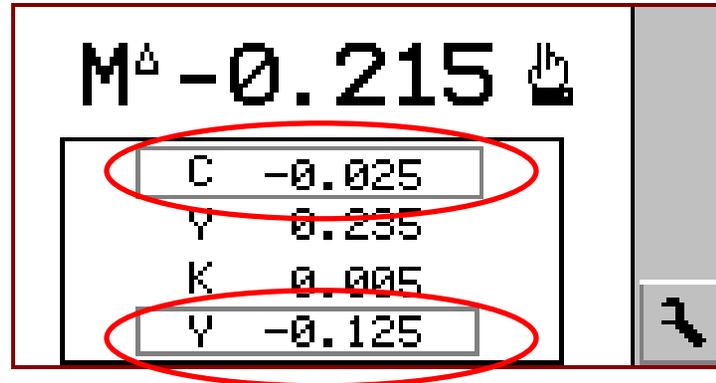
Dot gain measurements are marked in the same manner during measurement and when they are placed in the history stack.

Gray balance measurements are not entered in the history stack but are displayed with the same technique.

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Functions and Technical Specifications

Instrument Functions

- Automatic zeroing
- Automatic color recognition (CMYK)
- Automatic patch type recognition (solid, tint percentage, balance, trapping)
- Density
- Density difference
- Gray balance
- Trapping
- Secondary densities, color balance
- Dot % (Murray Davis)
- Dot gain (shadow, mid-tone, highlight)
- Print Curve (absolute tint percentage)
- Traffic Light Indicator with correction advice
- 1 customized reference set
- 3 predefined reference sets (glossy coated, matt coated, uncoated)
- Density slope adjustment

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Technical Specifications

Illumination	Light Emitting Diodes, 45°/0° geometry
Aperture	3 mm (Option 2 mm or 1mm)
Density Range	D 0,00 – 2,50
Percent	% 0 – 100
Measuring time	0,5 seconds
Graphical Display	160x80 Pixel, 4 gray scales
Repeatability D	+/- 0.01D, $0.2\Delta E_{ab}$
Linearity %	+/- 1 %
Serial Interface	USB
Measurements per battery set	Over 500,000
Batteries	2 AA Alkaline 1.5 V
Filter	Status T
Polarization filter	optional
Dimensions	6.75x3x1.75in. 175x75x47mm
Operating condition	10°C to 40°C 10% to 80% relative humidity non-condensing
Storage conditions	-20°C to 60°C 10% to 90% relative humidity non-condensing

Warranty and Contact Information

Warranty
The complete instrument is covered for THREE YEARS against manufacturing defects for Parts and Labor.
The light source and filters are covered for SEVEN YEARS against failure and fading.
Warranty repairs or replacement will be performed on instruments shipped freight prepaid to our office.

Unlimited technical support is provided for the life of the instrument. Support calls are toll-free in the US and parts of Canada.

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