FLUO

UV Ink Densitometer Instruction Manual
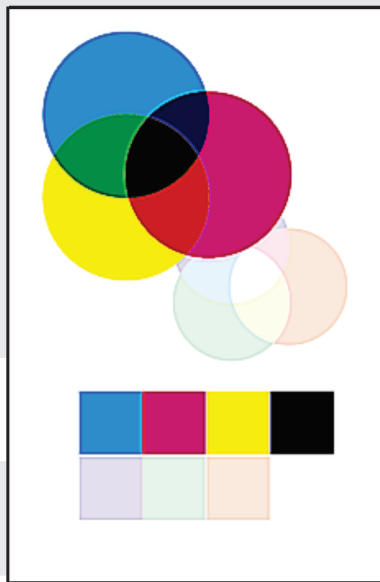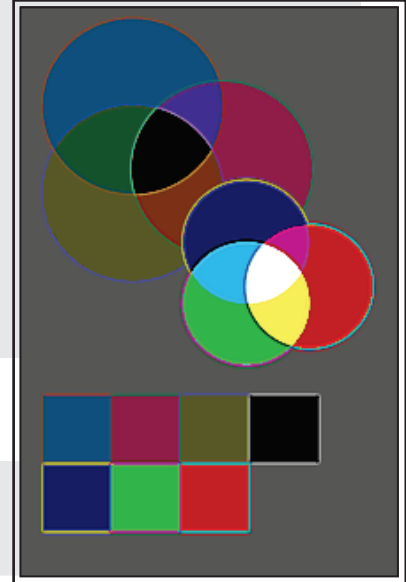## MODEL: BASIC / Measure Fluorescence
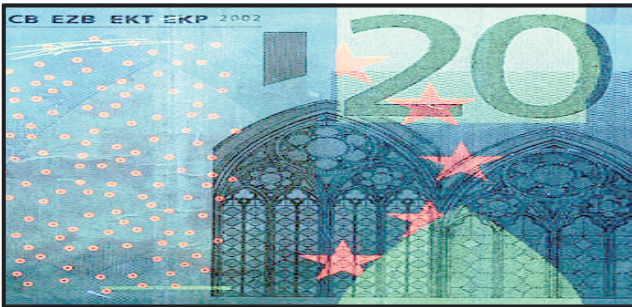
Measure

CIE, XYZ, xy, Lch, BiFL, Delta E

Red Fluorescence

Green Fluorescence

Blue Fluorescence
Fluorescence dot area %

Technology

Near UV LED
Tristimulus sensor
Auto dynamic range

Visible Light
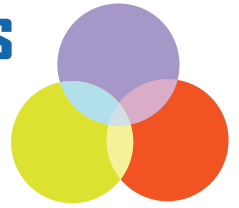
UV-LED

FLUO ▢ Invisible Ink Densitometer

Fluorescence and Phosphorescence Colorimeters

UV Ink Densitometer

Trademark & Counterfeit Protection

Control the Ink Film Thickness of Invisible Inks

FLUO Advanced (Fluorescence & Phosphorescence)

Improve Brand Security & Protection

- Solid Ink Coverage
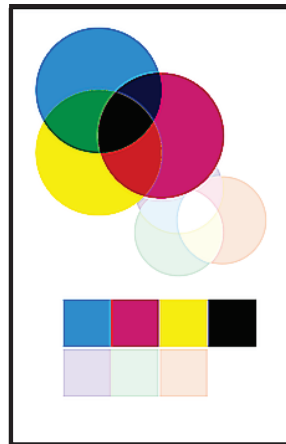- Fluorescent Tint Images
- Overprint Control

Invisible Ink Measured In The Visible Spectrum

MODEL TYPES

Incorporate Protection with Clever Designs

FLUO BASIC
**Fluorescent Measuring
UV LED for Near UV (365nm)**

FLUO ADVANCED
Fluorescent and Phosphorescence Measuring, Dual UV LED for Near (365nm) and Far (256nm)
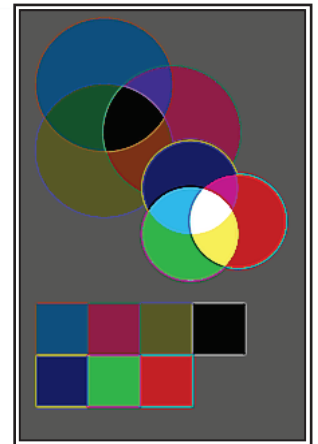
Visible Light   **UV-LED**

Serial Numbers, QR Codes
Digital Signatures
Tapes and Labels
Synthetic Paper
Smartphone Apps

Track & Trace
Holographic Images
RFID Printed Memory
Tracer Particles
DNA Markers

BETA INDUSTRIES
The Quality Control Company

FLUO Invisible Ink Densitometer
Instruction Manual

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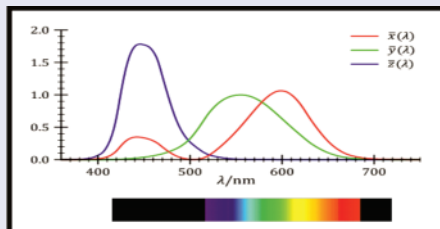# FLUO Fluorescence Densitometer ▲ ▲ ►

The FLUO BASIC Fluorescence measurement device is equipped with near UV (365 nm). The dominant wave length of the near UV illumination is 365nm (nanometers).

On the receiver side there are three channels to measure the fluorescent effect according to the sensitivity of human eye, i.e. X (red sensitivity), Y (green sensitivity), and Z (blue sensitivity).
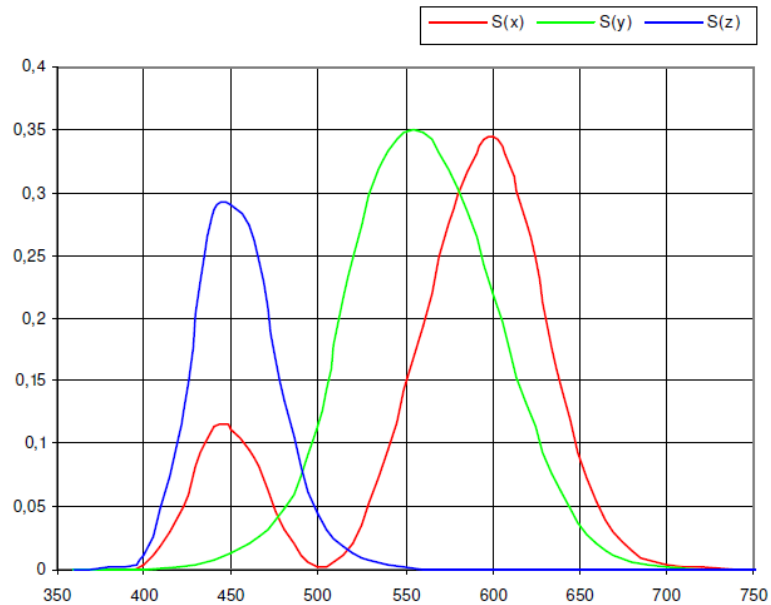
The FLUO BASIC is supplied with a USB 2.0 cable to output data to a PC.

Safety Instructions

For safety reasons it is absolutely necessary to read and understand the user's guide. If the safety recommendations and instructions in this User Guide are not complied with, measurement errors or data loss or physical injury or property damage may result.

- **FLUO** is not intrinsically safe. Therefore, the device cannot be used in an environment with explosive vapors where there is a risk of spark ignition. It should be protected against strong electromagnetic fields, chemicals, corrosive vapors, strong mechanical vibrations and impacts.
- Use the **FLUO** in ambient temperatures between 15°C (59°F) and 40°C (104°F), and do not expose it to direct sun light.
- The **FLUO** should never be opened as there are no user-serviceable parts. Doing so voids the guarantee. Contact your authorized dealer if repairs are necessary.
- To prevent the operator from looking directly into the UV light source the **FLUO** must be placed on a substrate while taking a measurement. A sensor detects if it is not placed on a substrate and prevents the UV illumination from being activated. No measurement will take place under this condition.
- To avoid incorrect handling, the **FLUO** should only be used by trained personnel
- Use only original **FLUO** spare parts and accessories.
- Use the original packaging exclusively when transporting.
- The **FLUO** is equipped with UV LEDs. Never look directly into the optical system of the device during measurement, even though it is equipped with a safety interlock.

Important: This manual describes the current version of the FLUO hardware and software. Future enhancements or modifications are reserved.

How to use the FLUO

During a measurement the FLUO BASIC will calculate three measurement values, one for X, one for Y, and one for Z.

The FLUO can be used in two modes: the **color** mode will show XYZ values, the **intensity** mode will show only the intensity of the near UV. The mode is selected in the Configuration shown below.

The LCD shows the actual measurement value. The active light source and the dominant channel are displayed by the flashing LEDs at the top of the FLUO device.
Example:
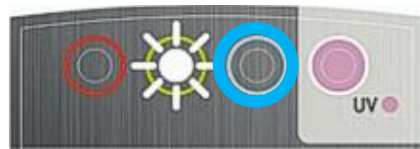
Example 1: green color channel (Y), near UV illumination, Color mode
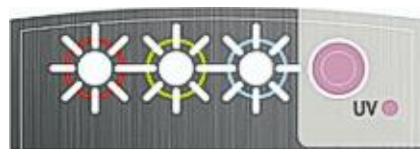
Example 2: near UV illumination, Intensity mode

RESET the FLUO

Press the RESET button on the bottom side of the device to perform a RESET. Resetting will delete all internally stored references. The display will show the device type for a few seconds.

   FLUO equipped with near UV LED only

After a few seconds the display will change and show the current firmware version number

After initialization the device will show '*0*'. The FLUO is now ready for measurements.

(⬤▶) Press the RESET button and keep the right key depressed during reset to perform a FACTORY RESET. The factory Reset will reset all settings and configuration to its defaults.

Configure the device to your needs

The FLUO can be configured to your needs in a special Configuration mode. Press and hold the right key for at least 5 seconds to enter Configuration mode

(⬤▶)

The configuration mode is indicated by a '~' in the left top corner of the LCD.
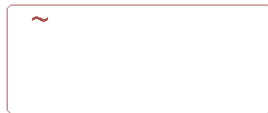
Two settings can be configured:
- a) Average Solid Reference
- b) Color Mode or Intensity Mode

(⬤▶) Click the right key to adjust the Average Solid Reference settings and Color or Intensity mode selection.

a) Use an average solid reference

The FLUO can be configured to calculate the average of a series of up to 10 readings on your reference patch. The number of readings that need to be measured to calculate the reference can be set in the Configuration mode. Averaging multiple readings can be useful when there is unevenness or variability in the reference patch print quality.

(⬤⌃) Click the up key on the device to increment the number of readings

(⬤⌄) Click the down key to decrement the number of readings

b) Select Color display mode or Intensity display mode

The FLUO can be used in two different modes.

In Color mode the dominant fluorescent color after any 100% reference reading will be displayed automatically. By clicking the right key after a measurement the next XYZ color channel will be displayed – followed by the XYZ color channels of the near UV readings.

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[oL
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The Intensity mode will display one value, expressing the total brightness of the light emission within the visual spectrum.

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Int
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Toggle between the two modes by clicking the left key.

Exit the configuration mode

Press and hold the right key for at least 5 seconds to exit the Configuration mode. The current configuration will be saved.

Zero reference and target reference calibration

The FLUO measures relative fluorescence using a non-fluorescent reference (0% or substrate) and a target fluorescent reference (100% target fluorescent ink layer). Follow the steps outlined below to set the Zero and Reference values.

Set the Zero reference

Position the FLUO with the aperture on a non-fluorescent surface, for example on the substrate without fluorescent ink. Press and hold the 'down' key ⊗ and push the device to the front until zero appears in the LCD.

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0
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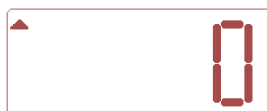
All measurement channels will be zeroed simultaneously.

Set a single solid reference [C 0]..[C 1]

If the average number in the settings is set to zero, the calculation of an average is disabled.

 Position the FLUO with the aperture on the fluorescent reference surface, for example on the substrate with fluorescent ink. Press and hold the 'up' key ⊗ and push the device to the front until *100* appears in the LCD.

The maximum reference measurement measures all channels simultaneously and sets the maximum fluorescent signal for each illuminant separately to 100%. The channel with the highest fluorescent response will automatically be displayed. When the Intensity mode is selected the intensity of the reference sample is set to 100% for near UV.

 In Color mode you can check the relationship between fluorescent responses in red, green and blue by stepping through the colors by pressing the 'next' button.

Measure an average solid reference [C 2]..[C 10]

If the reference measurement average counter is greater than 1, you must take as many solid reference readings as specified in the setting.

 Position the FLUO with the aperture on the fluorescent reference surface, for example onto the substrate with fluorescent ink. Press and hold the 'up' key ⊗ and push the device to the front until [C 1] appears in the LCD.

Now measure the next reference again with the middle key 'up' depressed.

Continue to measure references until the number of references specified in the settings is reached. Once all reference measurements are taken, the device will calculate the average and set this value to 100%

Measure samples in Color mode [*COL*]

Position the FLUO with the aperture on a fluorescent surface. Push the device to the front and hold it there until the measurement result appears in the LCD. The measurement value of the currently selected color channel is displayed.

The LED of the dominant visual color will blink.

The number displayed (79%) tells you that the sample emits only 79% of the light in the 'Y' channel (green) spectrum compared to your reference. This indicates to the operator that insufficient ink is being applied to the substrate.

 Click the right key to select the next color channel. The color channel selection will step through all color channels for near UV.

Measure a sample in Intensity mode [*INT*]

If your device has been configured to display the intensity only, the difference between the reference intensity and the sample intensity will be calculated and displayed in terms of a percentage value.

Position the FLUO with the aperture on a fluorescent surface. Push the device to the front until the measurement result appears in the LCD. The measurement value of the currently selected near UV is displayed.

The number -21 tells you that the fluorescent intensity of your sample is 21% lower than the fluorescent intensity of your reference. This indicates to the operator that insufficient ink is being applied to the substrate.

The near UV intensity measurement is displayed with RGB LED flashing. The far intensity is displayed with FUV LED flashing.

Underflow and Overflow measurements

The FLUO automatically checks the validity of measurement results and displays a warning in case of invalid measurement:

Underflow

An underflow occurs when the measurement resolution is too low. This can occur when the fluorescence of the sample is extremely low. In this case the FLUO displays *uF* in the proper measurement channel.

Overflow

The FLUO has a very large dynamic range with an Automatic Gain Control. An overflow error is very rare, occurring only when the fluorescent signal in one channel exceeds the range of the AGC. The overflow for the affected channel is then displayed as *oF*.

Open aperture

For safety reasons the UV LED will not switch on if the device is not positioned on a substrate. In this case the display will show '*OOO*'.

Measurement time too short

Keep the FLUO in front position until the measurement result appears in the LCD. If you move the FLUO back to its parking position too early, the '---' in the LCD tells you that measurement time was too short.

Replacing the batteries

The FLUO is powered by two 1.5V AA alkaline batteries. No charger is needed as they will typically last many months in normal service

- Remove the cover from the battery compartment by pressing down on the center near the front of the battery cover and sliding it towards the rear
- Remove the old batteries and dispose of them in accordance with local regulations
- Insert the new batteries with the polarity as shown on the label inside the compartment
- Replace the battery cover
- Always replace always both batteries at the same time
- If you do not use the devices for an extended period of time it is recommended to remove the batteries from the battery compartment.

Contact for Technical Support

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