FLUO invisible Ink Densitometer Instruction Manual

Content

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FLUO

The FLUO UV-Fluorescence measurement device is equipped with either with two UV light sources, one in the near UV and one in the far UV or in case of FLUO 365 only with the near UV light source. The dominant wave length of the near UV illumination is 365nm while the dominant wave length of the far UV illumination is 280nm. The FLUO can be equipped with 255nm replacing the 280nm Illumination.

P	366nm ±5nm	280nm ±5nm	255nm ±5nm
H	15nm	15nm	12nm
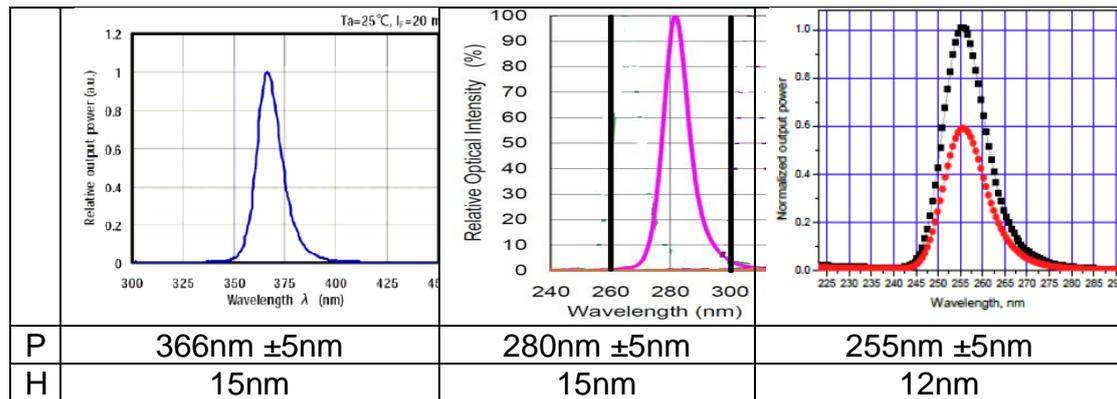
On the receiver side there are 3 bandwidths to measure the fluorescent effect according to the sensitivity of human eyes, i.e. X (red sensitivity), Y (green sensitivity), and Z (blue sensitivity).
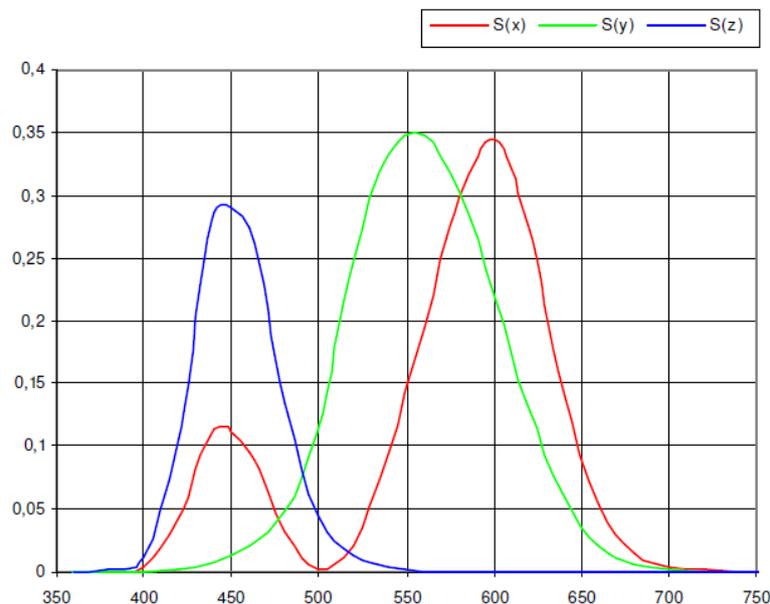
The FLUO is supplied with a USB 2.0 cable to output data to a PC. As an optional there is offered the FLUOcol Software which connects to the device.

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Safety Instructions

For safety reasons it is absolutely necessary to read through the user's guide and all of the instructions it contains. 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 or in an area with strong electromagnetic fields. It should be protected against 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 them 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 light source the **FLUO** should be positioned onto a substrate while taking a measurement. If not positioned onto a substrate there cannot be taken any measurements as the UV illumination will not switch on at all.
- To avoid incorrect handling, the **FLUO** should only be used by trained personnel
- Use original PERET spare parts and accessories only.
- Use the original packaging exclusively when transporting.
- The **FLUO** is equipped with UV LEDs. Do never look directly into the optical System of the device during measurement.

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 in case of FLUO 365 there will be calculated three measurement values, one for X, one for Y, and one for Z. In case of FLUO (near and far UV) there will be displayed additional X, Y, and Z values for the far UV response (280nm or 255nm). The FLUO can be used in two modes: the color mode will show XYZ for near and far UV, the intensity mode will show only the intensity of the near or the far UV. The mode is selected in the configuration (see below).

The LCD shows the actual measurement value. The active light source and the receptor are displayed by a flashing LED on top of the FLUO device.

Example:
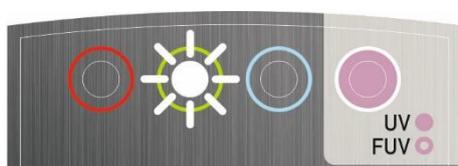
Example 1: green color channel (Y), near UV illumination, color mode
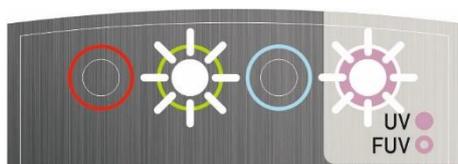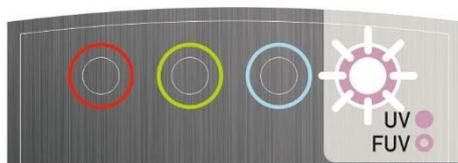
Example 2: green color channel (Y), far UV illumination, color mode
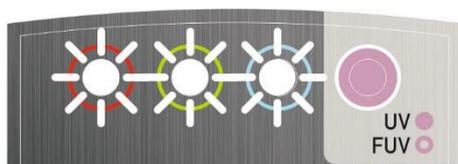
Example 3: near UV illumination, intensity mode

Example 4: far UV illumination, intensity mode

A little triangle symbol in the left top corner of the LCD tells the operator, that far UV is active. In case of near UV illumination there will be no triangle symbol in the left top corner of the LCD.

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.

 in case of near UV LED only

 in case of near and far UV LED

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

After initialization the device will show '0'. Now the device is 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 the right key for at least 5 seconds to enter configuration mode

The configuration mode is displayed by a '~' in the left top corner of the LCD.
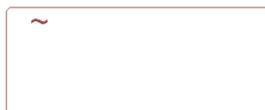
There are actually two settings that can be configured:
   a) Average Solid Reference
   b) Color Mode or Intensity Mode

⊗ Click the right key to switch between below settings a) and b)

a) Use an average solid reference

The FLUO can be configured to calculate the average of a sequence of up to 10 readings on your reference patch. The number of readings that need to be measured to calculate the reference can be configured in the configuration mode

˜ C 0   ˜ C 10

⌃ 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 or intensity display

The FLUO can be used in two different modes.

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

CoL

The intensity mode will display only two values, one for near UV and one for Far UV, expressing the light emission inside the visual spectrum.

Int

⌄ toggle between the two modes by clicking the left key on your device.

Exit the configuration mode

⟳ Press 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). Perform the following steps

1. Zero the FLUO on an area of the substrate clean of fluorescent ink or use the black reference of the calibration target as zero reference.
2. Measure the 100% reference on a sample reference from your ink supplier or your in house reference.
3. Measure on various locations of your printed product and check the amount of fluorescent ink in relation to your reference.

Measure the zero reference

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

```
▴
        0
```

All measurement channels will be zeroed simultaneously.

### Measure 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 onto the fluorescent reference surface, for example onto the substrate with fluorescent ink. Press down the 'up' key ⌢ and push the device to the front until 100 appears in the LCD.

```
▴
    100
```

The max reference measurement measures all channels simultaneously and sets the max. fluorescent signal for each illumination (near and far) separately to 100%. The channel with the highest fluorescent response will automatically be displayed. In case the Intensity mode is selected there will be set the Intensity of the reference sample to 100% for near UV and for far UV.
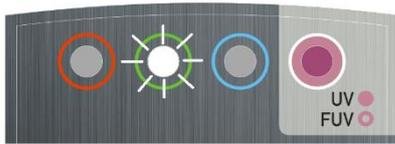
 In Color mode you can check the relationship between fluorescent responses in red, green and blue by clicking through the colors pressing the 'next' button. In Intensity mode you can toggle between near UV and far UV Intensity by pressing the right button.

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

If the reference measurement counter is greater than 1, there have to be taken as many solid reference readings as specified in the settings.

 Position the FLUO with the aperture onto the fluorescent reference surface, for example onto the substrate with fluorescent ink. Press down 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 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 average to 100%
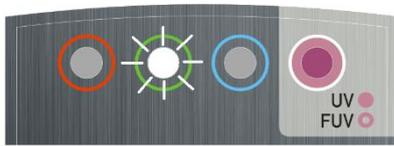

Measure samples in color mode [CoL]

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

The LED of the color is flashing.

The number displayed (79%) tells you, that the sample does emit only 79% of the light in the 'Y' (green) light spectrum compared to your reference. As a consequence, there are more fluorescent particles required to match your reference.

 Click the right key to select the next color channel. The color channel selection will go through all color channels XYZ near followed by XYZ far restarting with XYZ near again.

Measure a sample in intensity mode [Int]

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

Position the FLUO with the aperture onto 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 or far channel is displayed.

The number -21 tells you that the fluorescent intensity of your sample is 21% lower than the fluorescent intensity of your reference. In order to match your reference there have to be added fluorescent pigments.

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

Click the right button on your device to toggle between near and far intensity.

Underflow and Overflow measurements

The FLUO does automatically check the plausibility of measurement results and displays proper warnings in case of invalid measurement:

Underflow

An underflow happens, if the measurement resolution is to low, such as between 100% fluorescence and 0% fluorescence there are less than 50 ADC digits (2% per digit). In this case the FLUO displays uF in the proper measurement channel.

Overflow

The FLUO has a large dynamic range with auto Gain setting – such as an overflow happens quite rarely. The overflow is reached whenever the signal obtained in one channel is higher than the top level of the ADC. The overflow for the proper channel is then displayed as oF.


Open aperture

For safety reasons the UV LED will not switch on if the device is not positioned onto a substrate. In this case the Display will show 'ooo'.

Measurement time to short

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

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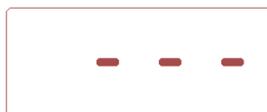
Replacing the batteries

The FLUO is powered by 2 1.5V Size AA Batteries

- Remove the cover from the battery compartment
- Remove the old batteries
- Insert the new batteries. Make sure you insert the batteries with the polarity as described on the sticker inside the compartment
- Place back the battery cover into its position
- Dispose the old batteries in accordance with local regulations
- 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.