

# What are M0, M1, M2 and M3 Measurement Modes?

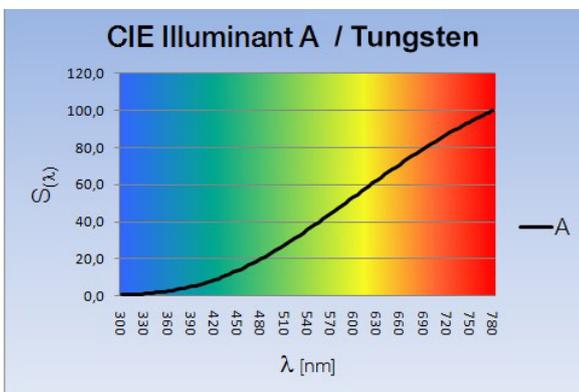
## Introduction

In the printing industry, delivering accurate and consistent color to the customer is of utmost importance. In the past, color management can be challenging with different set of measurement and instrumentation choices. This often results in inconsistent measurement data for the same sample.

To meet the printing industry's need for standardization in color measurement, the International Organization for Standardization established [ISO 13655:2009](#). It specifies four comprehensive color measurement modes, M0, M1, M2, and M3, developed for different needs and applications.

## Measurement Mode M0: The Legacy Mode

M0 is an obsolete measurement mode in the printing industry. In the past, color instruments used gas-filled tungsten lamp to illuminate samples. One shortcoming of tungsten illumination is that it does not have a defined or stable ultraviolet (UV) content.

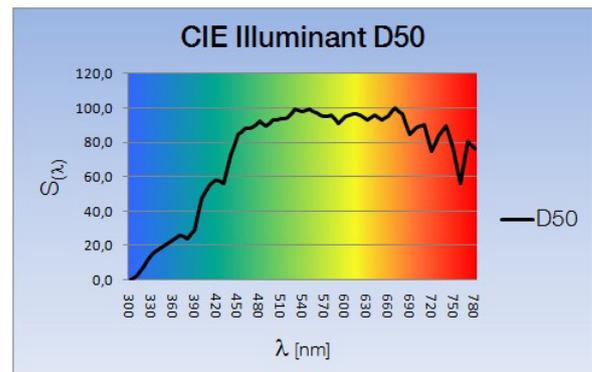


When using M0, the measurement of fluorescent samples like paper with [optical brighteners](#) may not correlate with the viewing environment.

## Measurement Mode M1: The All-Time Desired Mode

The intention of measurement mode M1 is to standardize viewing conditions and minimize issues when communicating color of fluorescent samples.

The color viewing standard used is the [ISO 3664:2009](#). It mandates that the light source contains UV content and comply with the spectral distribution specified by CIE illuminant D50.



This is to ensure that fluorescent sample respond similarly when illuminated during color measurement and viewed in a D50 viewing environment.

## Measurement Mode M2: UV-Cut

The measurement mode M2 was introduced to reflect viewing conditions that are free of UV content, hence, it is often referred to as "UV-Cut".

The exclusion of the UV content is accomplished by equipping color measuring instruments with UV-Cut filter to ignore the effect of fluorescence from the measurement data. A customer may request a print to be measured using M2 mode as the viewing environment such as museum is free of UV content.

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## Measurement Mode M3: The Offset Printers' Mode

Offset printers are often needed to control wet sheets during production and the final product which is dry. One of the main concerns is that as the wet sheets dried up, the density of the ink drops and changes the surface gloss. Measurement mode M3 is used to predict the density of a dried sheet from the measurement of a wet sheet.

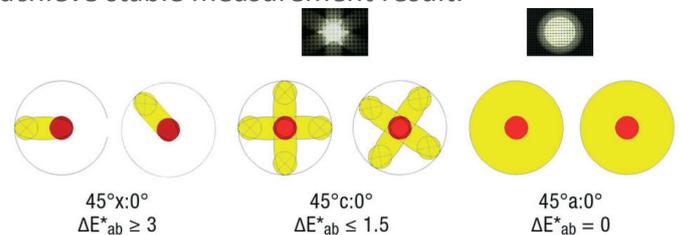
This is accomplished by using polarization filters, which removes surface reflection from the wet sheets, minimizing the difference in gloss between the wet and dry sheets.

## Measurement Geometries

Beside the measurement modes, measurement geometry is of equal importance. Measurement results vary even with a little shift in instrument directional positioning.

Moreover, difference become larger on uncoated or textured paper. Outlined in ISO 13655:2009, with reference to ISO-5-4, the following geometries are recommended to achieve stable measurement result.

- Normal: 45 degrees annular 0°:45°a
- Normal: 45 degrees circumferential 0°:45°c
- 45 degrees annular: normal 45°a:0°
- 45 degrees circumferential: normal 45°c:0°



Konica Minolta [Spectrodensitometer FD-7](#) corresponds to all four measurement conditions specified in ISO 13655:2009. It is capable of measuring both color and density of prints for any illuminants.

Find out more about the basics of color measurement with our [free education handbook](#). Alternatively, you can call us at 6563 5533 or contact us through [here](#) for a free consultation with our color specialists.