



KONICA MINOLTA



Application Note - How to use the User Index on Tomatoes

User Index Settings for Efficient Tomato Grading Using CM-26dG and SpectraMagic™ NX2

The CM-26dG provides fast, accurate color and gloss measurement for tomatoes, supporting quality control from harvest to packaging

When measuring the quality of tomatoes, it is important to evaluate not only their color but also their glossiness. The [Konica Minolta CM-26dG spectrophotometer](#) is equipped with advanced features that allow users to measure both color (using $L^*a^*b^*$ values) and gloss (GU value) simultaneously. However, simply obtaining these measurement values is not always sufficient for efficient grading or classification in practical workflows.



What is User Index?

The User Index is a feature that enables users to define their own calculation formulas based on measurement values such as L^* , a^* , b^* , and GU (gloss unit). By registering a custom formula into the instrument (using the optional SpectraMagic™ NX2 software), the instrument can automatically calculate and display the result of that formula as a “User Index” (UE1–UE3) on the measurement screen. This allows for immediate, customized evaluation according to the specific needs of your application or product.

What is User Class?

In addition to the User Index, the User Class function allows you to classify measurement results into grades or ranks (such as A, B, C, D, E) based on the calculated User Index value. For example, you can set thresholds so that a User Index result of “4 or higher is classified as “A”, 3 or higher as “B” and so on. Up to 51 classes can be defined, and the classification result (UC1–UC3) is displayed together with the User Index.

How to set the User Index?

You will need the [SpectraMagic™ NX2](#) to use the User Index and User Class on the instrument itself. The calculation result you have set will appear on the instrument after measuring the sample. For example, to create a User Index based on the calculation below,

$$\Delta E^*ab = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$$

You will need to write the equation below on the software, SpectraMagic™ NX2.

(ex) Sqrt(Pow(DL*, 2)+Pow(Da*, 2)+ Pow(Db*, 2))



How to set the User Class?

Based on the following criteria, the measurement values are classified into five classes: A, B, C, D, E (It can be classified up 50 classes).

User Index result	Class
4 or higher	A
3 or higher	B
2 or higher	C
1 or higher	D
lower than 1	E

The formula to set the class will be: CLASS(4“A”,4“B CLASS(n, “str1”, d1, “str2”, d2, “str3”, d3, ...)

n: Indicates the number of thresholds for classifying into classes. (This is the number of classes minus one, and it can be set up to 50.) “str1”, d1: If the user class judgment result is greater than or equal to d1, “str1” will be displayed in the result field of the instrument. Note: str1 should be within 6 characters. d1 can be set as a number up to 20 characters, but only 5 significant digits are valid for calculation. Enter the thresholds in descending order from left to right.

You must always set a class to be displayed for cases that do not meet any of the thresholds. The total number of input characters (including CLASS()) must be within 200 half-width characters. If you do not use the user class function, leave the user class input blank. Use “.” for decimal points and “,” as the parameter separator.



Why is the User Index useful?

Traditionally, grading tomatoes by color and gloss involves checking $L^*a^*b^*$ values and gloss values against reference tables, which can be time-consuming and prone to human error. The User Index function solves this by:

- **Custom Grading with the User Index Function** Users can register their own grading formulas in the instrument, which calculates and displays the grading index automatically. This removes the need for manual table checks and reduces human error.
- **Automatic Classification with the User Class Function** The User Class function automatically sorts tomatoes into grades based on the User Index. Up to 51 classes can be set, and results are shown instantly for multiple grading schemes.
- **Flexible and Objective Grading Workflow** Users can set custom weights and grade boundaries for each parameter. This enables efficient, objective, and adaptable grading for various quality standards.

Key Benefits of using the CM-26dG:

- **Fast Measurement:**
Measures color and gloss simultaneously in about 1 second, boosting productivity. Quick measurements help streamline workflows and reduce overall inspection time.
- **User-Friendly Operation:**
Compact, lightweight, and easy to use with wireless data transfer. Features like an LED viewfinder and intuitive controls make operation simple, even for beginners.

