

## ■ Introducing Colorimetry

Color only exists through the combination of three elements: a light source, an object and an observer. Color becomes a subjective sensation, which can be described with a color name. The International Commission on Illumination defined some standards allowing us to quantify colors. In consequence, colorimetric spaces are defined for different pairs of illuminant/observer and the color is identified by three coordinates, for example CIELAB, CIELUV...

Two categories of instrument are used for characterizing the color of an object: the colorimeters and the spectrocolorimeters. A colorimeter is a very simple system proposing a series of colored filters in order to simulate the normalized curves of a standard observer. The measurement is not very accurate and it does not allow users to detect differences that are invisible for some illuminants and visible for others (metameric colors). However, a spectrocolorimeter includes a dispersive component (grating, prism) allowing the measurement of the light reflected by the object in a much more precise manner, for the whole range of visible wavelengths.

## ■ RUBY spectrocolorimeter

**RUBY** has been designed to help manufacturers save money by providing a solution for real time measurement of the color. The fast detection of color drifts and servo-controlling production tools possibilities allow a cost reduction for a low level of investment.

- High acquisition speed,
- Non contact measurement,
- Synchronization with custom machines,
- Stand-alone use.

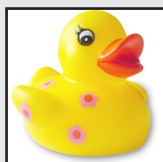
In addition to color monitoring, different kinds of application are available: Whiteness measurement, formulation, counter-typing, characterization of the effects of materials and light stability measurement (artificial or natural ageing).



## ■ Applications

Spectroscopic and colorimetric measurements are used for analyzing: Reflectance of diffusing materials and samples, Intensity and color of light sources and displays, transmittance of filters and liquids.

Plastic



Paper



Cosmetics



Paints



Inks



Food



Drugs



Fabrics



Wood



Ceramics



## Advantages

- Real time measurements for spectroscopy,
- Internal light source,
- Selectable spot size on the sample,
- Long working distance,
- Ergonomic and removable grip,
- Color and irradiance measurements,
- Metameric sample detection,
- Automatic color sorting,
- Integrated software solution
- Portable system allowing in situ measurements.

## Optoelectronic controller : technical specifications

RUBY CONTROLLER	
Power Supply	85 to 240 V (50 / 60 Hz)
Consumption	200 Watts
Light Source	Tungsten halogen lamp
Measuring frequency	up to 2000 Hz
Data processing	Embedded FPGA board
Analog outputs	2 outputs 0 - 10V
Digital outputs	Ethernet / RS232
Synchronization I/O	1 input (TTL) / 1 output (TTL)
Optical fiber connectors	SMA905 and FC/PC
Wavelength range	400-800 nm (other ranges on request)
Spectral resolution	0.6 nm / pixel
Humidity limits	5%-80% HR without condensation
Temperature in use	5 - 50° C
Dimensions	376mm x 363mm x 114mm
Weight	6 Kg

## Optical head

RUBY OPTICAL HEAD	
Spot size	1 / 2 / 4 / 7 mm
Working distance	80 mm
Depth of field	10 mm
Fastening thread	1/4"
Accessories thread	30.5 mm
Accessories	Contact tip, pods
Dimensions	60 mm diam. / 178 mm length
Weight	0.5 Kg



## Software

Model	Description
LRM	RUBY Manager software
RUBYDLL	DLL (Dynamic Link Library) for RUBY controller

### DLL for RUBY controllers

The “RUBYDLL” provides a powerful high-level interface enabling user’s-programs written in C/C++ language to communicate with RUBY controllers.

DLL compatibility
ANSI-C programs Microsoft Visual C++™ compilers (6, 7, 8 and .net versions) Microsoft Visual C++™ MFC

The main features of the DLL are:

- Initialize and connect to the controller through RS232 or Ethernet;
- Get/Set the sensor settings, e.g:
  - Color coordinates,
  - Color difference,
  - Spectral difference,
  - Colorimetry settings (observers, illuminants),
  - Spectral sampling,
  - Analog output settings,
  - Digital output settings,
- Calibrate Black,
- Calibrate White,
- Acquire a target to compare with the current measurement,
- Enable / Disable hardware trigger mode,
- Launch the measurement with other processes,
- Synchronize the measurement with other processes,
- Get the controller status and the “last error” parameter,

The “RUBYDLL” is delivered with a detailed User Manual and a large number of samples.

## RUBY MANAGER Software

Data processing is performed inside the RUBY controller. A desktop or notebook PC and the RUBY Manager software could complete the system in order to perform sophisticated measurements and analysis.

RUBY Manager is a powerful software which allows you to start measuring color with your new RUBY controller in minutes.

Thanks to its user-friendly interface, RUBY Manager software is the simplest way to gain complete control over all the settings of your RUBY controller.

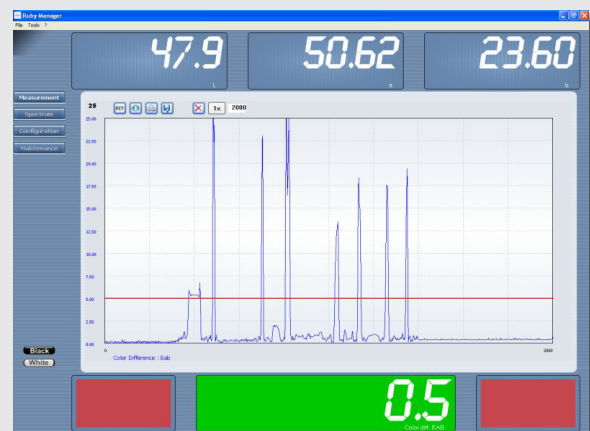
The interface offers two different display modes:

The measurement mode dedicated to color conformity control, and the spectrum mode, dedicated to curve display and comparison.

All the data is displayed in real time and allows the visualization of the historic of production process or chemical kinetic experiment monitoring.

Moreover, RUBY manager provides advanced maintenance functions:

- Update of the controller's firmware to take advantage of the latest enhancements and the new function developed by STIL's engineers.
- Unique "Diagnostics" function, allowing to record the current status of the controller into a file, which can be directly sent by email to STIL's application and support department.



The last version of RUBY Manager includes two new functions:

- Management of a database of reference colors,
- Monitoring of the quality of a production.

The first function allows the user to create a reference colors library that can be used for the online control of a varied production. In spectroscopy applications, the comparison with reference spectra enables the possible recognition of characteristic signatures.

The second function (Save in Regular Intervals) allows the user to save these data at a determined interval. This function is important for controlling the quality of a production over a long period.

### Minimal computer configuration

Windows XP  
512 MB RAM, 1 GHz  
RS232 (exported data: color coordinates) or Ethernet (exported data: all)