

In-Line Color Measurement System ERX50

Non-contact, spectral color measurement on a production machine with 45°:0° geometry (CIE Standard), with and without excitation of optical brighteners

Advantages of In-Line Color Measurement

- ✓ Possible corrections before production is out of tolerance result in reduced waste
- ✓ Continuous process monitoring, therefore early identification of disturbances (material, process, control)
- ✓ In-Line color measurement is needed for fast manual control and automatic control, resulting in stable production and faster and better color changes
- ✓ Documentation of the production (ISO 9001)

Special Advantages ERX50

- ✓ Base color and optical brighteners are measured separately. Therefore both components can be controlled independently.
- ✓ Same as in the lab: Stable color measurement data also when basis weight changes. Only the opacity changes
- ✓ Excellent results with real spectral resolution of 1 nm
- ✓ Ambient light, web speed and normal flutter do not influence the accurate measurement results

And this is new:

- ✓ Compact style based on the well-known, proven model ER 50 PA(F)
- ✓ Latest in electronics and technology
- ✓ Stable against distance variations
- ✓ Improved reproducibility
- ✓ Modular setup, thus even easier to service
- ✓ Verification of the automatic internal calibration
- ✓ Automatic calibration of the UV content
- ✓ If requested, much faster measurement interval
- ✓ CAN Bus for faster and more secure data transfer



**On-Line color measurement
pays off:
Better quality
and higher profit**

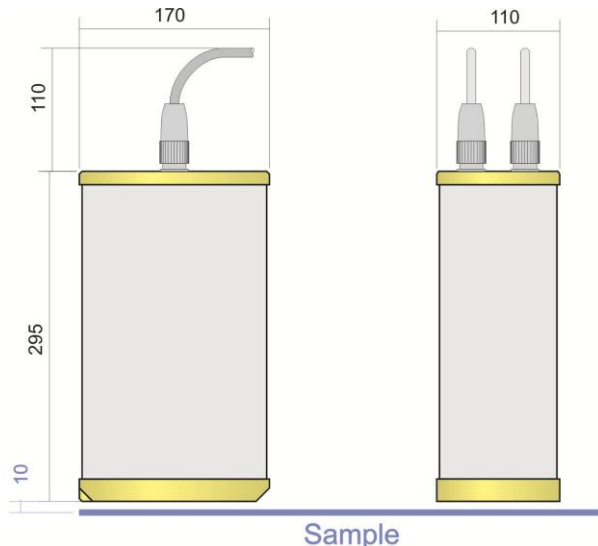


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Functional description ERX50

The ERX50 is a compact In-Line spectrophotometer with the standardized geometry 45°circular:0°.

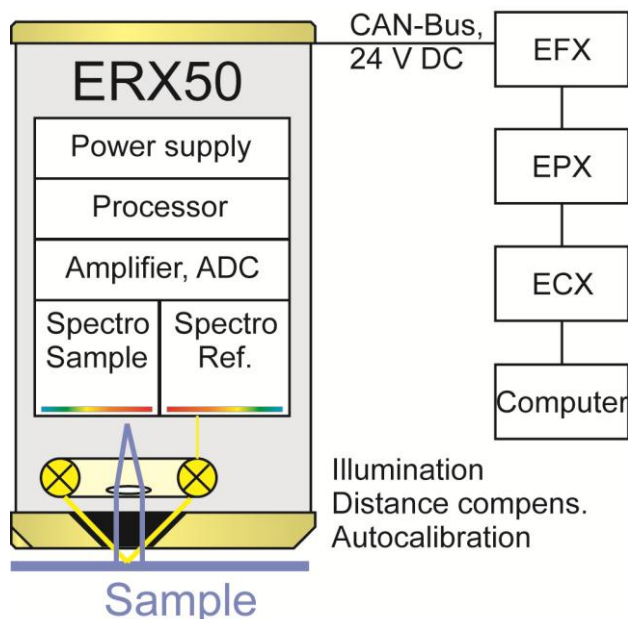
The sample is measured non-contact 10 mm (0.4 inch) off the instrument (picture 1).



Picture 1 Measurements

For a measurement a sample will be illuminated by white light (Xenon flash lamp, daylight) and light without UV component under 45°circular for approx. 1 / 1000 sec. Vertical to the sample's surface (under 0°) the reflected light will be collected and guided to a high resolution spectrometer (picture 2).

Simultaneously with the sample measurement a reference measurement of the lamp will be taken with a second high resolution spectrometer (full dual beam design).



Picture 2: Function blocks in the ERX50

In both spectrometers the optical measurement signals will be separated into 401 different wavelength signals via corrected holographic concave gratings and measured via 401 photoelectrical sensors. The result is a true 1 nm spectral measurement resolution.

The measurement signals will be amplified and digitised with high resolution. A fast processor calculates corrected spectral reflectance data.

These 401 reflectance results (from 330 nm to 730 nm) are the basis for all further colorimetric calculations for any possible illuminant and observer (e.g. CIE Lab data for illuminant D65 / 10° observer or illuminant C / 2° observer).

The automatic internal calibration of the system also includes automatic wavelength calibration for excellent measurement accuracy and long-term stability. The calibration will be verified by measuring a known, coloured sample. Calibration of the UV part of the lamp will be checked via an internal brightened white standard. This guarantees high and reproducible measurement accuracy.

Control over the color measurement system ERX50 is done via USB interface by a computer (PC); the measurement data will be transmitted to the computer. The CAN bus interface allows distances between the computer and the measuring system of up to 1/3 mile. The built-in optical isolation guarantees stable operation in a real world production environment.

Typical Applications

The In-Line spectrophotometer ERX50 is well suited for all applications where the frequent, non-contact color measurement of a product is needed. In most cases it will be a continuous product.

References

The In-Line spectrophotometer ERX50 is successfully working In-Line for the measurement of

- ✓ Coated and uncoated paper
- ✓ Paper with optical brightener (FWA)
- ✓ Laminate paper
- ✓ Paper board
- ✓ Paper board with white top layer
- ✓ Tissue
- ✓ Pulp with and without optical brightener
- ✓ Plastic foils
- ✓ Textiles
- ✓ Fibres

Special advantages of the ERX50

- ◆ **Precise spectral color measurement**
 - ✓ Also critical colors and demanding applications can be measured with high quality based on the excellent spectral resolution of 1 nm.
 - ✓ The wide spectral range of the ERX50 from 330 nm to 730 nm gives excellent information.
 - ✓ The sample illumination has adjustable UV and non-UV settings for base white and the optical brightener.
 - ✓ Good correlation to the laboratory measurements.
- ◆ **Automatic measurement and calibration**
 - ✓ Precise color measurement because of automatic internal calibration.
 - ✓ Absolute automatic wavelength calibration with highest precision (0.07 nm). Therefore very good long-term stability and precision.
- ◆ **Stable, accurate measurements on the production machine**
 - ✓ 24 hours, 365 days per year automatic color measurement on the production machine
 - ✓ Despite flutter of a few tenth of an inch there are stable measurement results. Special distance compensation without moving parts makes this possible.
 - ✓ The production speed and ambient light have no influence on the accurate measurement results.
 - ✓ The unit is robust, splash water tight (IP 65) and rarely needs service thanks to the compact design.
 - ✓ The long-life Xenon flash lamp (1 year warranty) is a low-price item.
- ◆ **Opacity and stack measurement In-Line**
 - ✓ Simulation of the stack measurement right on the machine, which normally is used in the laboratory. This results in constant color measurement with changing basis weight!
 - ✓ If only the opacity of the paper changes in the machine, the color measurement remains stable, but the change in opacity will be displayed.
 - ✓ This enables opacity measurement of the paper. (Prerequisite: Measurement frame and software option).
- ◆ **This ER product family has been successfully measuring in hundreds of installations since 1987**
 - ✓ By continued development and improvements our customers have a proven system with the latest technology.
 - ✓ The current model is the fourth generation and has further improved technical data.
 - ✓ Development and production of the ERX50 spectrophotometer family in Germany.
 - ✓ Installations worldwide.

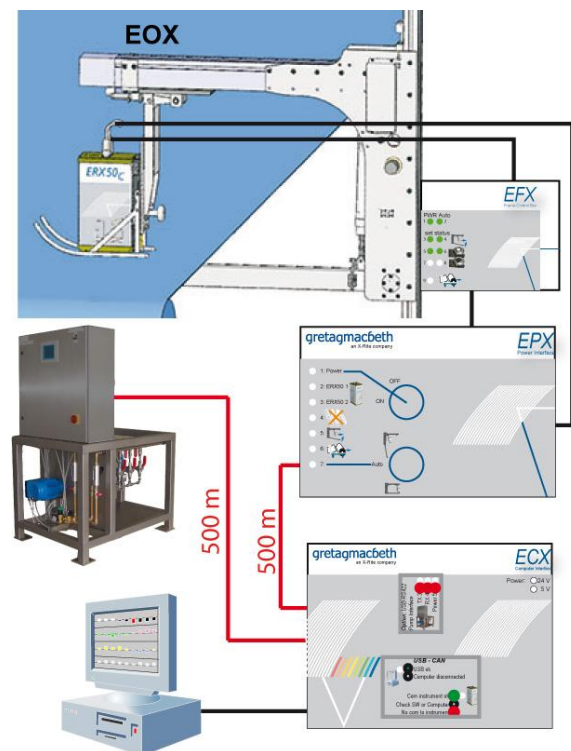
Turnkey In-Line color measurement system

The In-Line spectrophotometer ERX50 is typically sold as turnkey system directly from the manufacturer, including frame, software and computer (picture 3).

Support and service are available around the world.

At GretagMacbeth you find the experienced experts and proven partners for your color measurement and Closed Loop Color Control!

- ◆ **In-Line spectrophotometer ERX50 family**
- ◆ **Software**
 - ✓ Quality control
 - ✓ Opacity and stack measurement
 - ✓ Automatic Closed Loop Color Control
 - ✓ Machine interface (sheet break, stop)
 - ✓ Alarm signal
 - ✓ Link to other information systems
- ◆ **Measurement frame (customized)**
 - ✓ Measurement on the web
 - ✓ Measurement in wet stock
- ◆ **Dye dosing station**
 - ✓ For continuous control of dye addition
 - ✓ For Automatic Closed Loop Color Control



Picture 3: In-Line color measurement and optional Closed Loop Color Control



The GretagMacbeth group supplies:

- ✓ **Color data products (portable, benchtop, In-Line)**
- ✓ **Software for quality control, color matching and Closed Loop Color Control**
- ✓ **Light booths for visual inspection**
- ✓ **Densitometers, color management systems**

Technical Data ERX50, EPX and ECX

Color sensor ERX50

Non-contact measurement in the process; not sensitive to ambient light; automatic calibration and measurement; standardized measurement geometry 45°/0°; robust construction; high accuracy and precision; built-in diagnostics with service memory (remote diagnostic).

Illumination	45° circular
Lamp 1	D65 approximated, UV adjustable
Lamp 2	no UV, wavelength limit typ. 420 nm
Measurement	0°
Spectral measurement area with UV	330 nm ... 730 nm
Spectral resolution (optical !)	1 nm
Absolute wavelength accuracy with internal automatic control	better than 0,1 nm
Dual beam (sample and reference channel)	simultaneous
Measurement time	20 ms
Measurement area	12 mm diameter
Measurement distance (illumination head – sample)	10 mm
Distance variation with error $dE^* < 0,15$	8-20mm
Measurement interval	20 sec typ., 3 sec min.
Reproducibility CIELAB (standard deviation for repeated difference measurements of the white standard)	$\Delta L^*, \Delta a^*, \Delta b^* \leq 0.03$
Interinstrument agreement between ERX50 systems Based on a white tile	$\Delta L^*, \Delta a^*, \Delta b^* \leq 0.1$
Average color difference for measurement of the 12 BCRA standards from production average	$\Delta E^* < 0,3$
Size	approx. 170 x 110 x 295 mm ³
Weight	approx. 5 kg
Protection	IP 65, CE Mark
Calibration (traceable to PTB)	instrument specific white standard
Communication with computer	CAN-Bus, with interface converter on USB
Spectral data directly from the measm. head (330nm - 730nm)	measured in steps of 1 nm
More data will be available via the computer (see evaluation programs ESWin)	
Ambient temperature:	max. 60°C, with cooling case EGX50PL max. 80°C

Power interface EPX

Input Voltage	115V/230V AC, +25% / -15%, 45-440 Hz
Power consumption	max. 100 VA, typ. 10 VA
Measurement head interface	max. 20 m cable
Size approx.	265 x 265 x 135 mm ³
Weight approx.	2.3 kg
Protection	IP 65, CE Mark

Computer interface ECX

Input Voltage	115V/230V AC, +25% / -15%, 45-440 Hz
Power consumption	max. 100 VA, typ. 10 VA
Interface to EPX trough CAN-Bus	max. 500 m cable
USB interface to computer	typ. 1.5 m, max. 3 m cable
Size approx.	265 x 265 x 135 mm ³
Weight approx.	2.4 kg
Protection	IP 65, CE Mark



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