

# In-Line Spectrophotometer ERX55

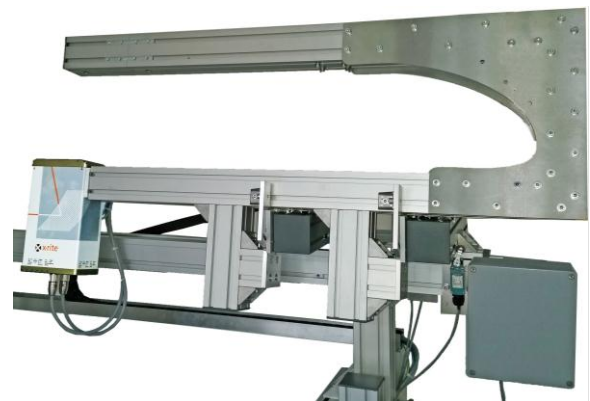
Non-contact, high spectral resolution spectrophotometer to measure color, light transmission and correlated haze in transmission on any production machine.

## Advantages of In-Line color measurement

- ✓ Possible corrections before production is out of tolerance result in waste reduction
- ✓ Continuous process monitoring, therefore early identification of disturbance (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 ERX55

- ✓ Accurate transmission color measurement data
- ✓ Non-contact correlated Haze measurement
- ✓ Excellent results with real spectral resolution of 1 nm.
- ✓ Ambient light, web speed and normal flutter do not influence the accurate measurement results.



ERX55 with measurement frame

## Functional description ERX55

The ERX55 is a compact In-Line spectrophotometer with transmission geometry. It allows color, light transmission and also correlated Haze measurement.

The sample is measured non-contact 20 mm (0.8 inch) apart from the instrument, 245 mm (9.6 inch) apart from the transmission receiver and up to 1000 mm (39 inch) from the edge of the sample (figure 1).

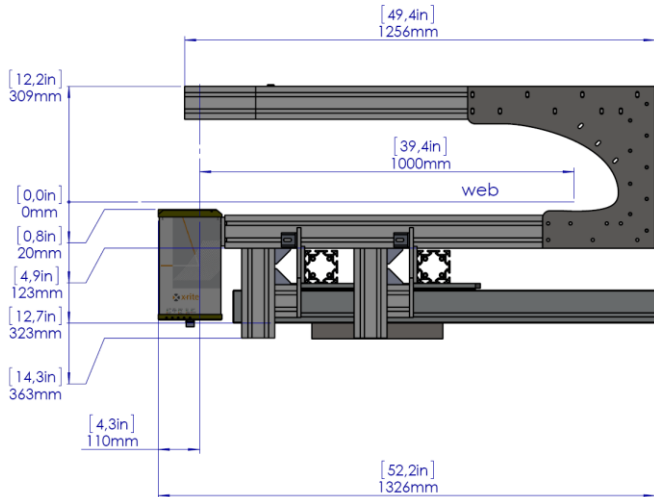


Figure 1: ERX55 size and measurement distance

For a measurement the sample is illuminated with white light (Xenon flash lamp, close to daylight) with ultraviolet (UV) content. The flash duration is around 20 ms. Normal to the sample surface (under 0°) the transmitted light is collected and guided to a high resolution spectrometer (figure 2).

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

In both spectrometers the optical measurement signals will be separated into 400 different wavelength signals via corrected concave gratings and measured via 400 photoelectrical sensors. The result is a true 1 nm spectral measurement resolution.

The measurement signals are amplified and digitized with high resolution. A fast processor calculates corrected spectral reflectance data. These 400 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).

To ensure an automatic calibration, the ERX55 is mounted on a linear track. This moves the system inside the web to measure; but if there is a sheet break or for calibration the whole setup moves out of the web into a parking position.

The automatic calibration of the system also includes automatic wavelength calibration for excellent measurement accuracy and long-term stability.

Control over the color measurement system ERX55 is via CAN-bus interface to ensure a trouble free long distance communication. Right before the computer the CAN-bus signal is converted into USB, so that any regular computer can be used for the ESWin Software. This allows distances up to 300 m (1000 ft). The built-in optical isolation guarantees stable operation in a real world production environment.

## Typical applications

The In-Line spectrophotometer ERX55 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, transparent or translucent product.

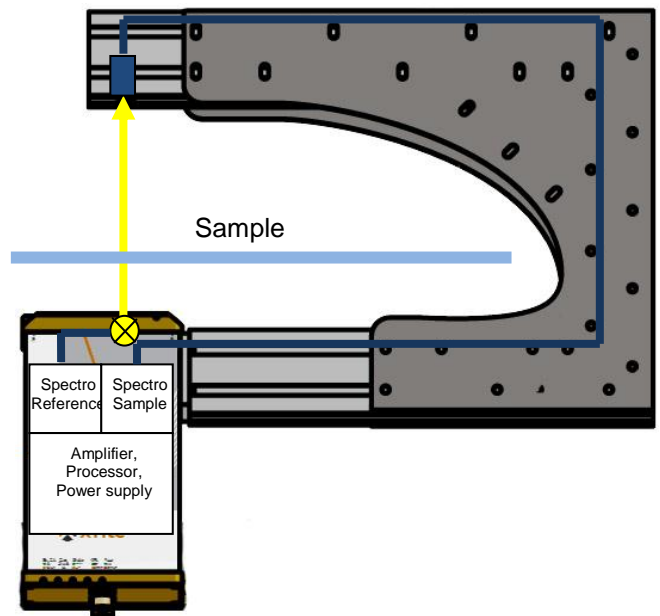


Figure 2: Functional blocks of the ERX55

## Special advantages of the ERX55

### ▶ **Precise spectral color measurement**

- ✘ Even 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 ERX55 from 330 nm to 730 nm gives excellent information.

### ▶ **Automatic measurement and calibration**

- ✘ Precise color measurement because of automatic calibration.
- ✘ Absolute automatic wavelength calibration with highest precision (0,07 nm). Therefore very good long-term stability and precision.
- ✘ Continuous 24/7 automatic color measurement on the production machine.

### ▶ **Stable, accurate measurement results on the production machine**

- ✘ Despite flutter of a few mm (tenth of an inch) there are stable measurement results.
- ✘ The production speed and ambient light have no influence on the accurate measurement results.
- ✘ The unit is robust, dust tight (IP 50) and rarely needs service thanks to the compact design and digital data processing and transmission.
- ✘ The longlife Xenon – flash lamp (1 year warranty) is a low-price item.

### ▶ **Correlated Hazemeasurement In-Line**

- ✘ Simulation of the laboratory Haze measurement right on the machine.
- ✘ Non-contact Haze measurement does not cause scratches.

### ▶ **The ER product family has been successfully installed in hundreds of installations since 1987.**

- ✘ Meaningful internal redesign and improvements have been made over the years. Therefore our customers have a proven system with the latest technology.
- ✘ The current ERX line is the third generation and has further improved technical data.

### ▶ **Development and production of the ERX family is in Germany.**

## In-Line color measurement system

Typically the In-Line spectrophotometer ERX55 will be sold as turnkey system (figure 3).

Local support and service is available in all important areas around the world.

### ▶ **In-Line Color measurement system ERX55**

- ✘ Software (for PC with Windows)
- ✘ Quality control
- ✘ Transmission and Haze measurement
- ✘ Machine interface (sheet break, stop)
- ✘ Alarm signal
- ✘ Link to other information systems
- ✘ Measurement frame (customized)

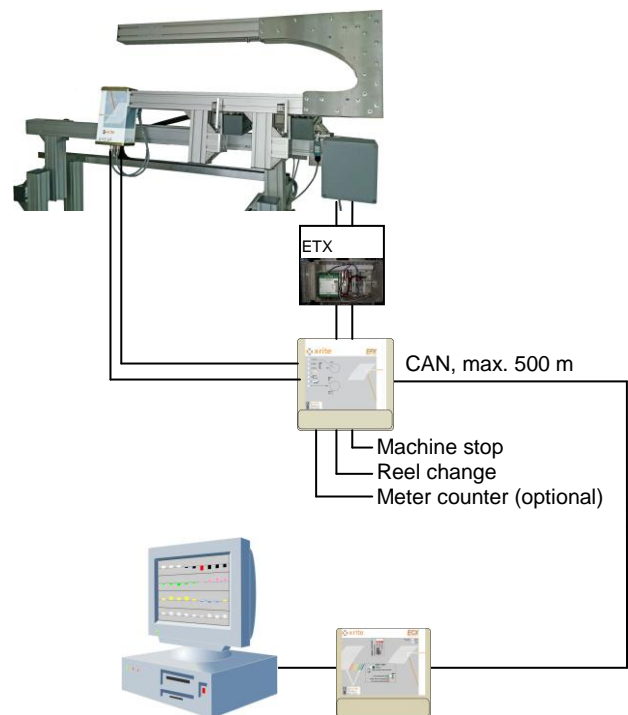


Figure 3: In-Line transmission color measurement with correlated Haze



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

## Technical data ERX55

### Measurement head ERX55

Robust construction, high accuracy and precision, built-in diagnostics with service memory (remote diagnostics).

Spectral range (UV included)	330 nm ... 730 nm
Spectral resolution (optical!)	1 nm
Absolute wavelength accuracy with internal automatic control	better than 0.1 nm
Double beam (sample and reference channel)	simultaneous
Measurement time	20 ms
Protection	IP 50, CE mark
Calibration (traceable to PTB, Germany)	instrument specific white standard
Communication with computer	CAN-Bus, with USB converter
Illumination	Diffusor D65 approximated
Viewing direction	180° (transmission)
Measurement area	12 mm diameter
Distance from measurement point to sample edge	700 mm
Measurement distance (illumination head – sample)	20 mm
Measurement distance (sample - transmission receiver)	245 mm
Distance variation with error $dE^* < 0,15$	+/- 3 mm typ.
Repetition time	20 sec typ., 5 sec min.
Reproducibility (standard deviation for repeated difference measurements on a hazy plastics sample)	$\Delta E^* < 0.08$ , $\Delta Hz < 0.3$ , $\Delta LT < 0.3$
Inter-instrument agreement between two ERX55: (average deviation on a set of selected transparent samples)	$\Delta E^* < 0.2$ ; $\Delta Hz < 0.8$ , $\Delta LT < 0.8$
Size with measuring head and C-frame	ca. 1256 mm x 632 mm x 130 mm
Weight excl. traversing beam	ca. 20 kg
Surrounding temperature:	60°C (140°F) with cooling case 80°C (176°F)
Input voltage	220V / 110V AC, +25% / -15%, 45-440 Hz
Power consumption	max. 150 VA
Computer interface	optically isolated, CAN bus, max 300 m

### Traversing beam

The traversing beam will be adjusted to the customers needs. A typical configuration is:

Total dimensions incl. ERX55, cable chain, ...	2,5 m x 1,0 m x 0,6 m (99" x 39" x 24")
Motion length:	1,55 m (61")
Actuators: 2 limit switches (one on each side)	1 reference switch 1 emergency switch
Protection:	IP65



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