Appendices

939 Instrument Specifications

Measurement Geometrics	0/45°, DRS spectral engine, choice of optical aperture: 4mm, 8mm, and 16mm
Light Source	Gas-filled tungsten lamp
Illuminant Types	A, C, D50, D65, D75, F2, F7, F11, & F12
Standard Observers	2° & 10°
Response Types	A, E, I, T, Ax, Ex, & Tx
Receiver	Blue-enhanced silicon photodiodes
Spectral Range	400 nm – 700 nm
Spectral Interval	10 nm – measured, 10 nm – output
Storage	1,024 standards with tolerances, 2,000 samples
Measurement Range	0 to 200% reflectance 0 to 2.5D
Measuring Time	Approx. 2 seconds
Inter-Instrument Agreement	0.15 ΔE^*_{ab}, based on avg. of 12 BCRA series II tiles* 0.30 ΔE^*_{ab} max. on any tile* ±0.005D or ±0.5% whichever is greater (for Status T Response at SWOP™ recommended density values)
Short-Term Repeatability	.05 ΔE^*_{ab} max. on white ceramic, standard deviation ±0.005D 0-2.0D ±0.5% 2.1-2.5D
Lamp Life	Approx. 500,000 measurements
Power Supply	Removable (Ni-metal hydride) battery pack; 7.2 VDC rated @ 1450 mAh.
AC Adapter Requirements	Input 100-240 VAC, 50-60Hz, 12Vdc Output
Charge Time	Approx. 4 hours – 100% capacity
Measurements Per Charge	1,000 measurements typical
Data Interface	Patented bi-directional RS-232, 300-57,600 baud
Display	128 x 256 pixel graphical LCD
Operating Temperature Range	50° to 104°F (10° to 40°C) 85% relative humidity maximum (non-condensing)
Storage Temperature Range	-4° to 122°F (-20° to 50°C)
Dimensions	4.3"H (10.9 cm) 3.3"W (8.4 cm) 7.7"L (19.6 cm)
Weight	2.4 lbs. (1.1 kg)
Accessories Provided	Calibration Standard, Manual, AC Adapter, Carrying Case, Verification Reference, Measuring Apertures
Usage	Indoor only
Altitude	2000 m
Pollution Degree	2
Overvoltage	Category II

X-Rite reference standards are traceable to the National Institute of Standards and Technology through Munsell Color Science Laboratory RIT.
*8mm aperture.

938 Specifications

Densitometric Measuring Functions:

Absolute	Minus Paper	Notes
DEN	DEN	
DOT		
TRAP		Preucil, Brunner, or News
PC	PC	
H/G or H/S	H/G or H/S	
BRIGHT		per TAPPI T452 om-87
λDEN, λDOT or λREFL	λDEN	20nm Increments

Colorimetric Measuring Functions:

Absolute	Difference	Indices:
CIE XYZ	Δ(XYZ)	
X%Y%Z%	Δ(X%Y%Z%)	
CIE Yxy	Δ(Yxy)	
CIE LAB	Δ(L*a*b*)	ΔE^*_{ab}
Hunter LAB	Δ(Lab)	ΔE
CIE LUV	Δ(L*u*v*)	ΔE^*_{uv}
CIE LCH	Δ(L*C*H*)	ΔE*(ab, CMC, or uv space)
		Whiteness per ASTM E313
		Whiteness & Tint per CIE
		Yellowness per ASTM E313
		Yellowness per ASTM D1925

Display: 2 row by 16 character Supertwist dot matrix LCD

Measuring Geometry: 0°/45°, fiber optic pickup, multi-sensor array

Measuring Area: 8.0mm & 4.0mm (20mm optional)

Light Source: Gas filled tungsten lamp, approx. 2856°K (corrected for D65 illuminant)

Illuminant Types: C, D_{65}, D_{50}, A, F2 (cool white fluorescent), F7 (broad-band white fluorescent), F11 (TL84), & F12 (Ultralume 3000)

Standard Observers: 2° & 10°

Response Types: T, E, I, & A (ANSI PH218, ISO 5/3, DIN 4512)

Measurement Range: 0 to 200% reflectance
0 to 2.5D

Spectral Range: 400nm - 700nm

Spectral Interval: 20nm (15nm bandwidth)

Resolution: .01%

Inter-Instrument Agreement: 0.20ΔE* average (based on average of 12 BCRA tiles)
± .005D or ± .5% whichever is greater (for Status T Response at SWOP™ recommended density values)

Short Term Repeatability: 0.05 max ΔE* on a white ceramic (20 measurements)
± .005D 0-2.0D
± .5% 2.1-2.5D

Warm Up Time: None

Measurements per Charge: Approx. 1000 typical

Measuring Time: Approx. 2 seconds

Data Interface: Patented Bidirectional RS-232, 300 to 9600 baud (user selectable), bipolar output

Power Supply: Six rechargeable AA NiCad batteries
7.2v total rated @ 600mAh (included)

Charge Time:	Approx. 14 hours
AC Adaptor Requirements:	938 90-130VAC, 50-60Hz, 18W Max. 938X 180-260VAC, 50-60Hz, 20W Max.
Operating Temp. Range:	50°-104°F (10°-40°C)
Storage Temp. Range:	-4°-122°F (-20°-50°C)
Weight:	2.3 lbs. (1050 grams)
Dimensions:	3 3/16" H x 3" W x 7 3/4" L (81mm H x 76mm W x 197mm L)
Accessories Provided:	Calibration Standard Operation Manual Reference Guide AC Adaptor Carrying Case

X-Rite reference standards are traceable to the National Institute of Standards and Technology through Munsell Color Science Laboratory RIT.

A2 Optional Accessories

Part Number

- X-RiteColor® Master 1242
- 4/8mm Aperture Kit 968-100-08
- 20mm Aperture Kit. 968-100-20
- 8mm Aperture Attachment (UV excluding). 968-61-08E
- Spectrophotometer Stand 968-80
- Security Cable 418-75

- Interconnect cable for Macintosh computers with 8 pin mini-DIN connector. 418-79
- Modular Interconnect Cable (requires adaptor below) SE108-69
- DB25P DCE (Null Modem) Interface Adaptor. 418-70
- DB25S DCE (Null Modem) Interface Adaptor 418-71
- DB25P DTE (Normal) Interface Adaptor 418-80
- DB25S DTE (Normal) Interface Adaptor 418-81
- DB9P Interface Adaptor 418-90
- DB9S Interface Adaptor 418-91
- 4mm Target Window 968-121-04
- 8mm Target Window 968-121-08
- 20mm Target Window 968-121-20

A3 Factory Presets

Shown below are the factory presets for the Averaging, Colorimetric & Densitometric Operation, I/O, and Format parameters.

AVERAGING PARAMETERS

Average	- 01
Sub Average	- 1

COLORIMETRIC OPERATION PARAMETERS

Tone	- SOFT
XYZ	- OFF
Yxy	- OFF
L*a*b*	- ON (CIE)
L*u*v*	- OFF
L*C*h°	- ON (ab space)
Whiteness	- OFF
Yellowness	- OFF
Auto Reference	- ON

DENSITOMETRIC OPERATION PARAMETERS

Auto Color	- ON
Den	- ON (Absolute)
Dot	- ON
Yule/Nielson	- 1.000
Trap	- Preucil
P/C	- ON (Absolute)
H/G	- ON (Absolute)
Bright	- ON
λDen	- ON

RS232 I/O PARAMETERS

RCI	- ON
BAUD RATE	- 1200
CR/LF	- Carriage Return With Line Feed
HANDSHAKE	- OFF

FORMAT PARAMETERS

Printout	- AUTO
Comp/Print/Spectral	- COMPUTER
λDen Print	- ALL
All Print	- OFF
Print Header	- OFF
Print Reference	- OFF
Decimal Point	- ON

☞ > The unit is shipped from the factory displaying "L*a*b*" and illuminant/observer "C 2°". If the memory is reset, the function, illum/obs, and all parameters will return to the settings described above.