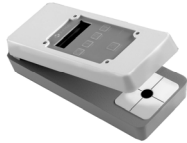


X-Rite 331C Densitometer Operator's Guide

Copyright © 2010 by X-Rite Incorporated "ALL RIGHTS RESERVED" X-Rite® is a registered trademark of X-Rite, Incorporated All other logos, product names, and trademarks mentioned are the property of their respective holders.



FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CAUTION: Operational hazard exists if battery charger other than X-Rite SE30-177 is used.

VORSICHT: Betriebsgefahr! Bitte verwenden Sie ausschließlich das Ladegerät X-Rite SE30-177.

ADVERTENCIA: No use otro cargador de las pilas que no sea la pieza X-Rite SE30-177, por el riesgo de mal funcionamiento del equipo.

ATTENTION: Ne pas utiliser d'adaptateur autre que SE30-177 de X-Rite au risque de mauvais fonctionnement de l'appareil.

AVVERTENZA: Non usare un altro caricabatteria che non è del pezzo X-Rite SE30-177, per il rischio di malfunzionamento dell'apparecchio.

P/N 331C-10 1 Rev. D

AC Adapter Operation

Before using: Make sure the voltage indicated on the AC adapter complies with the AC line voltage in your area. If not contact your dealer.

The instrument automatically turns on when the AC adapter is plugged in. You can turn the instrument off at any time by pressing the OFF button.

Battery Operation

THE INSTRUMENT SHOULD BE FULLY CHARGED BEFORE USING FOR THE FIRST TIME. SEE BATTERY CHARGING FOR DETAILS.

To apply battery power, press the ON button. The instrument automatically turns off after 2 minutes of inactivity to conserve battery life. To manually turn the instrument off, press the OFF button.

CAUTION: When the batteries are nearly discharged, a small arrow in the upper left-hand corner of the display appears as an indication that the batteries are in need of recharging. When the arrow appears on the display, the read lamp is disabled. If the arrow displays during a measurement, the data for that measurement will be incorrect. **The batteries must be immediately recharged once the arrow indicator is displayed.** The densitometer will not operate at all if the batteries have completely lost their charge, until the AC adapter is plugged in.

Battery Charging

THE UNIT SHOULD BE FULLY CHARGED BEFORE USING FOR THE FIRST TIME. The unit can be operated while the batteries are being charged. The batteries take approximately one hour to reach a full charge from a discharged state.

NOTE: After batteries are fully charged (indicated by Green LED off), remove the AC adapter and operate the instrument from battery power until the display indicates that charging is required. Following this charging method will help prolong the life of the batteries.

Before charging: Make sure the voltage indicated on the AC adapter complies with the AC line voltage in your area. If not contact your dealer.

- Plug small connector end of the AC adapter into side of unit.
- Plug detachable line cord in the AC adapter and plug the line cord into the wall receptacle.

CE DECLARATION

Hereby, X-Rite, Incorporated, declares that this 331C is in compliance with the essential requirements and other relevant provisions of Directive(s) EMC 2004/108/EC, LVD 2006/95/EC, and RoHS 2011/65/EU.



Instructions for disposal: Please dispose of Waste Electrical and Electronic Equipment (WEEE) at designated collection points for the recycling of such equipment.

Limited Warranty

X-Rite warrants this Product against defects in material and workmanship for a period of twelve (12) months from the date of shipment from X-Rite's facility, unless mandatory law provides for longer periods. During such time, X-Rite will either replace or repair at its discretion defective parts free of charge.

X-Rite's warranties herein do not cover failure of warranted goods resulting from: (i) damage after shipment, accident, abuse, misuse, neglect, alteration or any other use not in accordance with X-Rite's recommendations, accompanying documentation, published specifications, and standard industry practice; (ii) using the device in an operating environment outside the recommended specifications or failure to follow the maintenance procedures in X-Rite's accompanying documentation or published specifications; (iii) repair or service by anyone other than X-Rite or its authorized representatives; (iv) the failure of the warranted goods caused by use of any parts or consumables not manufactured, distributed, or approved by X-Rite; (v) any attachments or modifications to the warranted goods that are not manufactured, distributed or approved by X-Rite. Consumable parts and Product cleaning are also not covered by the warranty.

X-Rite's sole and exclusive obligation for breach of the above warranties shall be the repair or replacement of any part, without charge, which within the warranty period is proven to X-Rite's reasonable satisfaction to have been defective. Repairs or replacement by X-Rite shall not revive an otherwise expired warranty, nor shall the same extend the duration of a warranty.

Customer shall be responsible for packaging and shipping the defective product to the service center designated by X-Rite. X-Rite shall pay for the return of the product to Customer if the shipment is to a location within the region in which the X-Rite service center is

A fully charged battery pack provides over 2000 measurements typically.

LED Indicator

The LED indicator located next to the power input receptacle has three modes to provide feedback of the battery status. The three modes are explained below:

Solid Green LED – Indicates that the batteries are being charged.

Continuous Blinking Green LED – This occurs when the charging requirements for the batteries are being evaluated (or when no battery pack is present). After a short period of time, the LED will turn on solid indicating charging is taking place.

Green LED Off – Indicates that the batteries are fully charged. You should remove the AC adapter at this point and operate the instrument from battery power until the display indicates that charging is required.

Occasional Blinking Green LED – This occurs when the instrument attempts to evaluate batteries for a brief time.

Nulling (zeroing) Procedure

Null must be established each time instrument power has been removed for more than one second. This is because the electronic memory is lost with power removal. Null remains very stable ($\pm 0.02D$) as long as power remains on. Null the instrument as follows:

- Remove film from reading area.
- Lower the reading arm. Press the "NULL" button and hold while pressing the "MEASURE" button.
- Hold both buttons down until the reading on the display has stabilized.

Absolute Den Measurement

Measure Absolute Density as follows:

- Null the instrument as previously described.
- Center the film area in question directly over the aperture under the reading arm. If you are reading a sensitometric step, the center 1/3 of the step should be measured.

located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations. Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service. Do not try to dismantle the Product. Unauthorized dismantling of the equipment will void all warranty claims. Contact the X-Rite Support or the nearest X-Rite Service Center, if you believe that the unit does not work anymore or does not work correctly.

THESE WARRANTIES ARE GIVEN SOLELY TO BUYER AND ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR APPLICATION, AND NON-INFRINGEMENT. NO EMPLOYEE OR AGENT OF X-RITE, OTHER THAN AN OFFICER OF X-RITE, IS AUTHORIZED TO MAKE ANY WARRANTY IN ADDITION TO THE FOREGOING.

IN NO EVENT WILL X-RITE BE LIABLE FOR ANY OF BUYER'S MANUFACTURING COSTS, OVERHEAD, LOST PROFITS, GOODWILL, OTHER EXPENSES OR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES BASED UPON BREACH OF ANY WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY OTHER LEGAL THEORY. IN ANY EVENT OF LIABILITY, X-RITE'S MAXIMUM LIABILITY HEREUNDER WILL NOT EXCEED THE PRICE OF THE GOODS OR SERVICES FURNISHED BY X-RITE GIVING RISE TO THE CLAIM.

General Information

General Description

The 331C instrument is a battery operated hand-held B/W Transmission Densitometer that has achieved the accuracy and stability of our A.C. powered versions. The unique size and shape makes it an ideal totable instrument for use in the plant, the lab, or on the road.

The instrument has its own light source and illumination area. Push-button control of display power, lamp, and zero make the instrument easy to use.

3. Lower the reading arm. Press the "MEASURE" button and hold for a few seconds until the lamp goes out.

4. Remove pressure on the MEASURE button so that the reading arm rises. The density measured will be displayed until the button is pushed again.

NOTE: When measuring density values above 2.50D, care should be taken that the reading head light seal is completely on the surface of the film being measured. Always measure density with the film emulsion side up.

Den Comparison Measurement

Compare Density readings as follows:

- Place reference film over aperture. Null the instrument as previously described.
- Place the film to be compared over the aperture and measure the density. This measurement is the difference between the reference film density and the compared film density. A minus (-) display indicates the compared film is a lower density.

NOTE: The unit can zero on densities up to 1.00D.

Light Table Illumination

Illuminate the light table without making a measurement by pressing the Lamp button. Use this feature in locating film spots to be measured.

Calibration

Frequency of Calibration Test

Under normal operating conditions, the instrument calibration test should be performed once a week.

Calibration Test

Calibration of this instrument should remain stable over a long period of time and over an extended range of voltage and temperature. However, if calibration is questioned a calibrated step tablet is

The 331C measures Density and Density Difference.

Specifications

Measuring Geometry Per ANSI PH 2.19

System Response

331C ANSI Visual
331COR Ortho

Measuring Range

331C 0 – 3.5D (1mm)
0 – 4.0D (2mm)
0 – 3.2D (1mm)

331COR 0 – 3.2D (1mm)

Accuracy < $\pm 0.02D$

Repeatability < $\pm 0.01D$

Zero Stability $\pm 0.03D$ per 8hr max

Scale Factor

(Slope) Stability $\pm 1\%$ per 6 months max

Warm-Up Time none

Measuring Location 5.5in. (14cm) throat depth

Power Requirements

Battery Pack SE15-43

AC Adapter SE30-177

Instrument Rating 12VDC @ 1.2 Amps

Measurements per Charge > 2000

Physical

Dimensions 2.0in H x 2.9in. W x 7.0in D
(5.08cm H x 7.46cm W x 17.78cm D)
Weight Gross 2.7lbs (1.2kg)
Net 1.5lbs (0.7kg)

Environmental

Operating Range +50° to +104°F (+10° to +40°C)

30% to 76% RH

Storage Range -4° to 122°F (-20° to +50°C)

5% to 95% RH

Usage Indoor Only

Altitude 2000m

provided to check against. Handle this tablet with care so that no dirt or fingerprints are deposited on the film surface.

Check calibration in the center of the step tablet area marked "CAL." "This measurement should be within +0.02D of the value marked on the step tablet.

Always return the step tablet to its protective cover.

Cal Procedure

If calibration needs to be changed, proceed as follows:

- Insert a small screwdriver into the hole on the right side of the instrument, engaging the potentiometer slot inside.
- Measure the calibrated step tablet in the center of the area marked "CAL."
- If the reading in the display does not equal that of the calibrated step tablet, adjust the potentiometer until it does.
 - To increase scale factor, rotate the screwdriver counterclockwise.
- Check the units null (zero) and renull if necessary.
- Repeat Steps 2 and 3 until the calibration and null settings are exact:

NOTE: The instrument measures for only a few seconds after the "MEASURE" button is pushed and held. Potentiometer changes after the bulb turns off and will not be noted until a new measurement is made.

Maintenance

General

The densitometer should be referred to the factory for repair within this warranty period. Attempts to make repairs within this time frame may void the warranty.

Always verify instrument calibration to assure proper instrument operation. Make sure all connections are properly made.

Cleaning

The exterior of the instrument may be wiped clean with a cloth dampened in water or mild cleaner whenever required.

Pollution Degree 2

Transient Overvoltage Category II

Accessories

Operation Manual, Transmission Reference, Calibration Screwdriver, and AC Adapter SE30-177

Specifications and design subject to change without notice. * This product covered by U.S. Patents and patents pending.

Unpacking

Remove the instrument from shipping carton. Inspect for possible damage. If any damage is noted, contact the transportation company immediately. Do nothing more until the carrier's agent has inspected the damage.

If damage is not evident, make sure the following items are included.

Registration Card (complete and mail), Transmission Densitometer, Calibration Step Tablet, Soft Vinyl Carrying Case, 1mm (331C) and 2mm (331C) Apertures, AC Adapter, and Calibration Screwdriver.

Your instrument was packaged and shipped in a specially designed carton to assure against damage. If reshipment is necessary, the instrument should be repackaged in the original carton. If the original carton is not available, contact X-Rite to have a replacement carton shipped to you.

Operating Instructions

Should your instrument become inoperative, refer to the troubleshooting chart on the opposite side of this sheet. If the problem cannot be rectified, refer the instrument to X-Rite or an authorized service center for proper servicing.

Applying Power

Your densitometer is designed to operate from the internal battery pack or from the AC adapter. As an added feature, the instrument will operate on the AC adapter with the battery pack removed.

Factory Repair

X-Rite, Inc. recognizes the need to provide complete technical repair service to their customers. Because of the complexity of the circuitry, all circuitry repairs should be referred to the factory or an authorized repair station.

The manufacturer will repair any densitometer submitted past warranty. Shipping costs to the factory shall be paid by the customer and the instrument shall be submitted in its special carton as a complete unaltered unit.

Lamp Replacement

A spare Lamp Assembly (P/N 331C-129) can be obtained from X-Rite, Inc. should your lamp fail. Replace as follows:

NOTE: Refer to illustration on page 11.

- Unplug the AC adapter from the instrument.
- Remove the bottom cover from the instrument by removing the four screws.
- Unplug the lamp connector from the P.C.B. assembly.
- Remove the two screws holding the lamp assembly. Remove the lamp assembly.

CAUTION: Make sure the new lamp surface is clean. Remove smudgemarks with alcohol on a lint-free cloth.

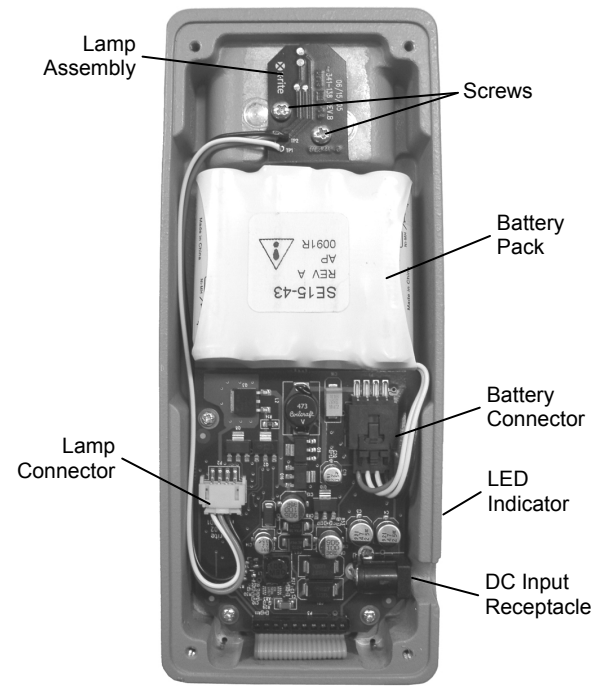
- Install the new lamp assembly into the lamp chamber assembly with the screws removed in Step 4.
- Attach the lamp connector to the lamp plug on the P.C.B. assembly.
- Secure the bottom cover to the instrument with the four screws removed in Step 2.

Battery Replacement

If it becomes necessary to replace the battery pack, use only part number SE15-43 supplied by X-Rite. To replace the batteries, use the following procedure.

NOTE: Refer to illustration on page 11.

1. Unplug the AC adapter from the instrument.
2. Remove the bottom cover from the instrument by removing the four screws.
3. Unplug the battery connector from the P.C.B. assembly and remove the old battery pack.
4. Install the new battery pack into the instrument.
5. Attach the battery connector to the battery plug on the P.C.B. assembly.
6. Secure the bottom cover to the instrument with the four screws removed in Step 2.



Troubleshooting Chart

The following chart is included to aid in troubleshooting your instrument. While troubleshooting, use caution to avoid danger of an electrical shock. While replacing parts always turn off the power.

Trouble	Cause	Remedy
Display will not light. (No decimal point)	Discharged or bad batteries. Internal component failure.	Recharge or replace. Return to the factory or authorized service center.
Display does not light (decimal point lit)	Power is just turned on. Internal component failure.	Press measure button. Return to the factory or authorized service center.
Light source will not light.	Failed light source. Discharged or bad batteries. Internal component failure.	Replace light source. Recharge or replace. Return to the factory or authorized service center.
Reading will not change.	Internal component failure.	Return to factory or authorized service center.
Reading will not hold.	Internal component failure.	Return to the factory or authorized service center.
Display turns off when meas. button is pushed.	Weak batteries.	Recharge batteries.



Corporate Headquarters

X-Rite, Incorporated
4300 44th Street SE
Grand Rapids, Michigan 49512
Phone 1 800 248 9748 or 1 616 803 2100
Fax 1 800 292 4437 or 1 616 803 2705

European Headquarters

X-Rite Europe GmbH
Althardstrasse 70
8105 Regensburg
Switzerland
Phone (+41) 44 842 24 00
Fax (+41) 44 842 22 22

Asia Pacific Headquarters

X-Rite Asia Pacific Limited
36th Floor, No. 169 Electric Road
Hong Kong, China
Phone (852)2568-6283
Fax (852)2885 8610

Please visit www.xrite.com for a local office near you.