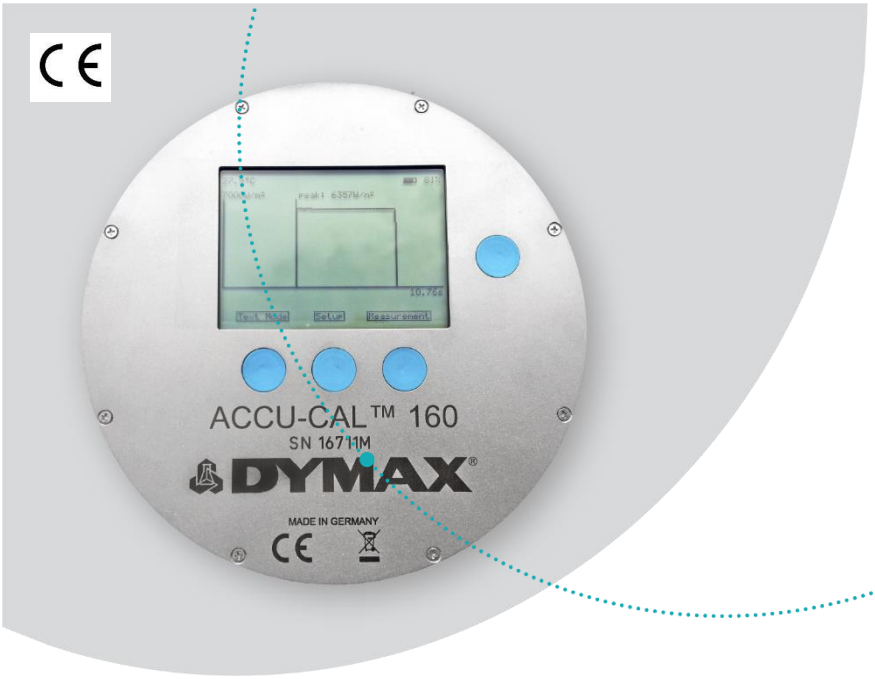
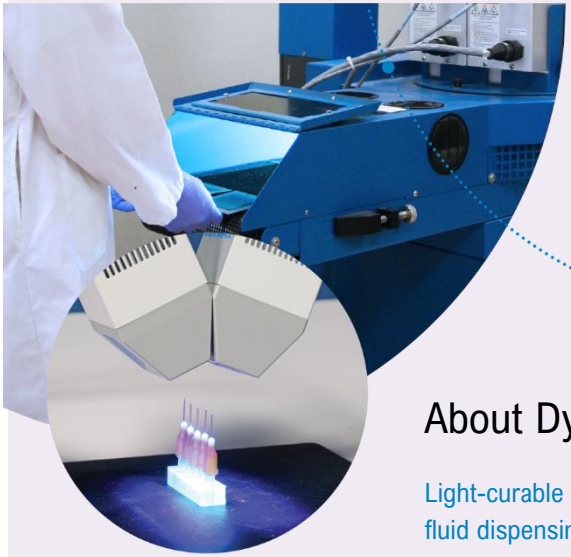


ACCU-CAL™ 160

Radiometer for UVA & LED

User Guide

DYMAX



About Dymax

Light-curable adhesives. Systems for light curing, fluid dispensing, and fluid packaging.

Dymax manufactures industrial adhesives, light-curable adhesives, epoxy resins, cyanoacrylates, and activator-cured adhesives. We also manufacture a complete line of manual fluid dispensing systems, automatic dispensing systems, and light-curing systems. Light-curing systems include LED light sources, spot, flood, and conveyor systems designed for compatibility and high performance with Dymax adhesives. Dymax adhesives and light-curing systems optimize the speed of automated assembly, allow for 100% in-line inspection, and increase throughput. System designs enable stand-alone configuration or integration into your existing assembly line.

The information contained within this guide is subject to change without notice. Please note that most dispensing and curing system applications are unique. Dymax does not warrant the fitness of the product for the intended application. Any warranty applicable to the product, its application, and use is strictly limited to that contained in the Dymax standard Conditions of Sale. Dymax recommends that any intended application be evaluated and tested by the user to ensure that desired performance criteria are satisfied. Dymax is willing to assist users in their performance testing and evaluation. Data sheets are available for valve controllers or pressure pots upon request.

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Introduction

This guide describes how to set up, use, and maintain the ACCU-CAL™ 160 radiometer safely and efficiently.

Intended Audience

Dymax prepared this user guide for experienced process engineers, technicians, and manufacturing personnel. If you are new to light-curing equipment and do not understand the instructions, contact Dymax Application Engineering for answers to your questions before using the equipment.

Where to Get Help

Dymax Customer Support and Application Engineering teams are available in the United States, Monday through Friday, from 8:00 a.m. to 5:30 p.m. Eastern Standard Time. You can also email Dymax at info@dymax.com. Contact information for additional Dymax locations can be found on the back cover of this user guide.

Additional resources are available to ensure a trouble-free experience with our products:

- Detailed product information on www.dymax.com
- Dymax adhesive Product Data Sheets (PDS) on our website
- Material Safety Data Sheets (SDS) provided with shipments of Dymax adhesives

Safety

The ACCU-CAL™ 160 radiometer is designed to be used in conjunction with Dymax light-curing equipment that is properly set up, with components correctly connected, and operated in accordance with relevant instructions. For eye protection when working with light-curing sources, use the provided goggles or a face shield that has been approved for UV protection. Use of long-sleeved shirts or lab coats are recommended to protect the arms and use of UV-opaque gloves are recommended to protect the hands.

We encourage you to read, understand, and follow all safety and operating instructions and recommendations in this and other related manuals prior to setting up and operating this instrument and any associated UV light-curing systems.

WARNING! *The device should only be used for its intended purpose and according to its technical specifications. Any other use of the device is not allowed.*

Always wear protective goggles or a face shield when working near any unit which emits UV light!

The device should be inspected before startup for any mechanical damage or loose parts. In such cases, the device should never be used. Safety can be compromised if the device is not functioning properly.

Product Overview

Description of the ACCU-CAL™ 160 Radiometer

The ACCU-CAL™ 160 radiometer measures and displays irradiance (intensity), irradiance profiles (irradiance over measurement time), and dose (irradiance for a given time period) of a light-curing system. Its compact size and design withstands the extremes of light-curing environments while providing accurate measurements.

The unit can be controlled manually via four buttons on the faceplate. Measurement data is displayed on the integrated LCD display screen and can be downloaded to a

computer via the USB port and supplied interface cable. The calibration data of the optical quantities is stored in the device and automatically considered. The ACCU-CAL™ 160 has a built-in lithium polymer battery that can be charged using the USB interface.

The ACCU-CAL™ 160 radiometer and data logger contains a photodiode and several filters for specific spectral sensitivities. The spectral sensitivity should be chosen to fit your measurement application. Several options are available upon purchase.

The input optics is made from a translucent diffuser material with approximated cosine field of view.

The device's internal temperature during calibration and measurement is recorded. With this information, the temperature dependency is automatically corrected within the device.

Environmental Considerations

Radiometers are sensitive to extremes in environmental conditions like high temperature, humidity, and contamination. Protect the device and its detector(s) from high humidity, high temperature, direct sunlight, and contamination.

- Do not use the ACCU-CAL™ 160 immediately after moving it from a cold to a warm environment. Under certain circumstances, condensation could arise and negatively impact the electrical and optical functions. Allow the radiometer to adjust to the temperature of the surroundings before switching it on.
- Do not use the ACCU-CAL™ 160 in powerful magnetic, electromagnetic, and electrostatic fields. These disturbances may influence measurement results.
- Do not expose the ACCU-CAL™ 160 to temperatures exceeding 60°C (140°F) during an exposure run. Exposure to temperatures exceeding 80°C will cause unit failure and will void the warranty.

Setup & Operation

Controls

Figure 1.
ACCU-CAL™ 160 Radiometer Face Plate

Display Window
Continuously displays the internal temperature of the device (top left), as well as the battery level (top right) in all menu mode screens.

The real time clock is set to UTC (Universal Time, Coordinated) values.

ON/OFF Button
To turn on, press & hold until the screen is illuminated.

To turn off, press & hold for 2 seconds.

Backlight Illumination
Press the On/Off button to turn the backlight on the display window on or off.

USB PC Connector
(side of unit)

Soft Button Operation
Right, Left, and Middle Buttons perform the function indicated on the Display Window's bottom line.

Turning on the radiometer: Press and hold the On/Off Button until the Display Window illuminates. The Display Window will briefly show the radiometer model name, serial number, software version, date of calibration, range, and wavelength band installed. Continuing to press the On/Off Button at startup will display the startup information until the button is released. The Display Window will then enter the default mode and show the data from the last run before the unit was turned off.

Turning off the radiometer: Press and hold the On/Off Button for approximately two seconds. The Display Window will indicate that the unit is shutting down and eventually turn off.

Turn backlight illumination on/off: Quickly press the On/Off Button.

Setup Menu

To enter the setup menu, switch the device on and wait for the welcome screen (Figure 2) to disappear. The graph mode or text mode screen will appear. Press the button in the middle to enter the setup (Figure 3).

Figure 2.
Welcome Screen

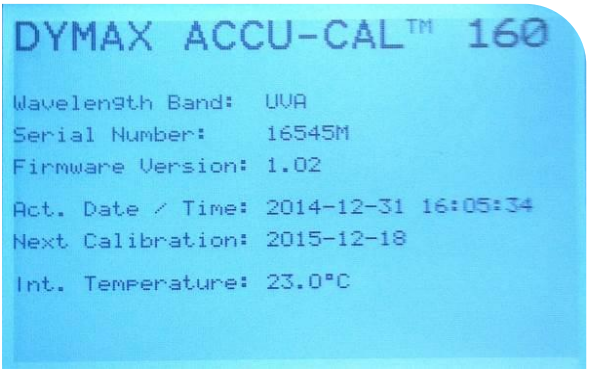
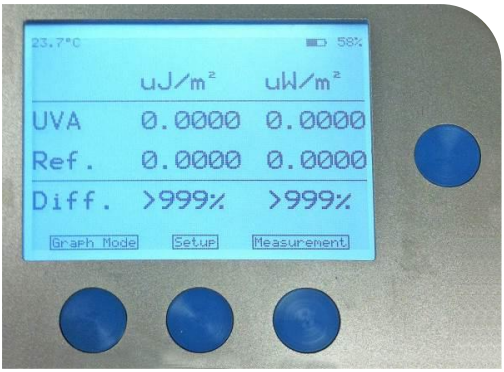


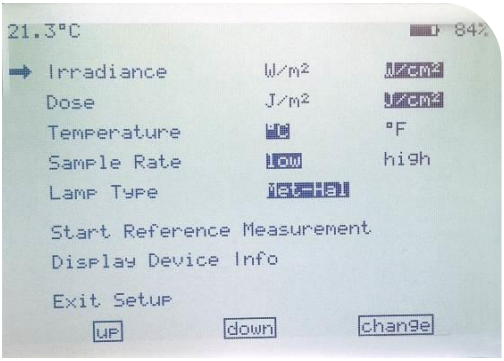
Figure 3.
Text Mode Screen - Push the Middle Button to Enter Setup



Once on the setup screen (Figure 4), you can toggle the units for irradiance and dose (per m² or per cm²), the temperature scale (°C or °F), the sample rate (low (25 Hz), or high (2,500 Hz)) the lamp type of your application for spectral correction (press the right button several times to select your lamp type. If your specific lamp model is not listed, select “unknown”).

To navigate through the setup menu, press the left button to move the highlighted selection up and the middle button to move the highlighted selection down. The right button is used to select the highlighted menu item.

Figure 4.
Setup Menu



In the setup menu, you can also start a reference measurement and display the device info; i.e., wavelength band, serial number, firmware version, date/time, next calibration date, internal temperature.

All settings are automatically saved to the device and are readily available upon device startup.

To exit setup, move the arrow to the bottom-most item and press the right button.

Perform a Measurement

To perform a measurement, press the right button when the text mode (Figure 5) or graph mode (Figure 6) screen is shown.

Figure 5.
Text Mode Screen

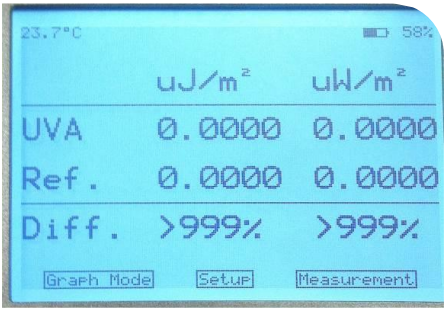
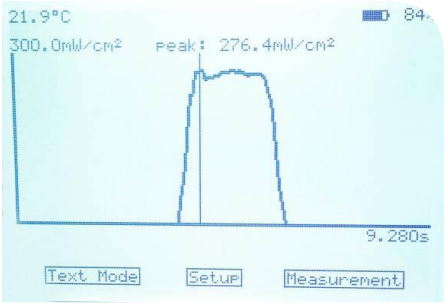


Figure 6.
Graph Mode Screen



A message “Start Measurement” is shown (Figure 7). To start the measurement, press the right button. If you have gotten to this screen by mistake and need to cancel the operation, press the left button.

Place the radiometer on the belt or object with the Optic Window (Figure 8) facing toward the light source. (The display window and buttons will be facing away from the source).

CAUTION: *Exposing the display window to high UV radiation will damage the display.*

Figure 7.
Start Measurement Screen

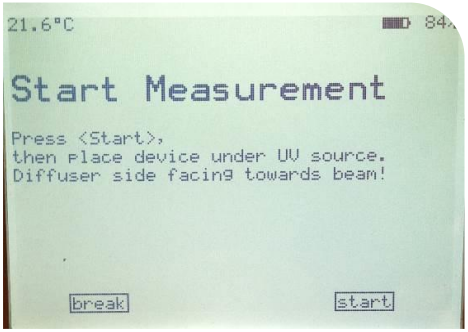
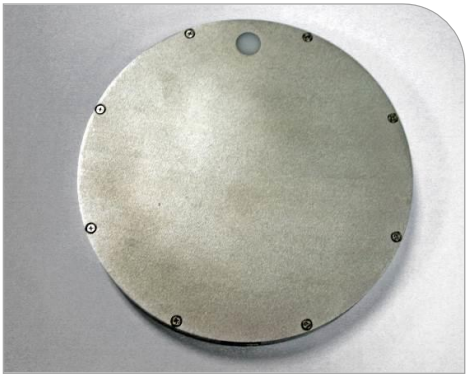


Figure 8.
Optics Window (Located on the Backside of the Radiometer)



When the radiometer exits the curing chamber, the measurement sequence will still be running. To end the sequence, press the right button.

The measurement is stopped when the device memory is full, and a warning message is shown if this is the case. The low sample rate corresponds to approximately 1,300 seconds of measurement time, the high sample rate to approximately 13 seconds.

Once the unit has stopped taking measurements, the results are shown on the front display. If the device was in the text mode (Figure 5)), the dose and peak irradiance are shown, along with the corresponding values of a reference measurement and the deviation to the reference. If the device was in the graph mode (Figure 6), the irradiance profile and peak irradiance are shown. To toggle between text and graph mode, press the left button. You may toggle between the two modes without any loss of data.

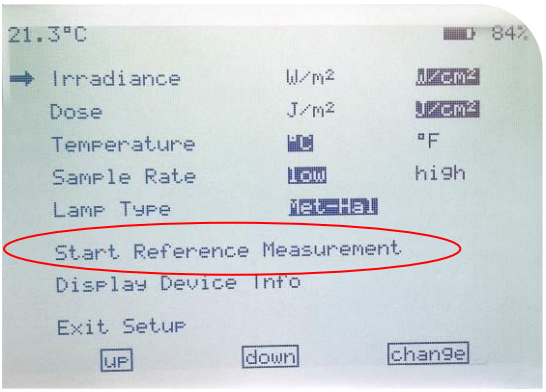
The measurement data is stored in the device and shown on the display until a new measurement is performed.

Perform a Reference Measurement

A reference measurement is a stored reading used to compare subsequent data readings to identify if any changes have occurred. To perform a reference measurement, enter the setup, move the arrow to the item “Start Reference Measurement”, and press the right button. A message “Start Reference Measurement” is shown. All further steps are similar to the normal measurement and described in the previous section.

After the reference measurement, you can either save or discard the recorded values as reference.

Figure 9.
Setup Menu



USB Interface

The device uses a USB interface for remote operation, data transfer, and charging of the built-in lithium polymer battery. The USB receptacle is Mini-B.

Figure 10.
USB PC Connector

Data Transfer

Measurement data can be transferred to a computer via the USB remote interface. The software tool “S-Accu-Cal 160” is provided with each order on a USB drive. It reads the data from the device and displays the peak irradiance, dose, irradiance, and temperature profile. The data can be saved as a text file and the graph can be saved as a png file. The download kit can be easily imported into Microsoft Excel.

Software Setup & Usage

To install the software, first plug the USB drive included with your order into a USB port on your computer.

On the USB drive, open the “S-Accu-Cal 160” folder and locate the “setup.exe” file. Select the “setup.exe” file and hit the run button to launch the installation wizard. Follow the instructions in the wizard to complete the software installation.

Once the software is installed on your computer, connect your radiometer to the computer.

Open the program by selecting the S-Accu-Cal 160 software icon on your desktop.

When the software is first opened it, a blank startup screen will display (Figure 11). Press the “reinitialize/change device” button in the upper right corner. This will pull the radiometers serial number and type into the boxes in the upper right corner. It will also open up the data import/export options on the left.

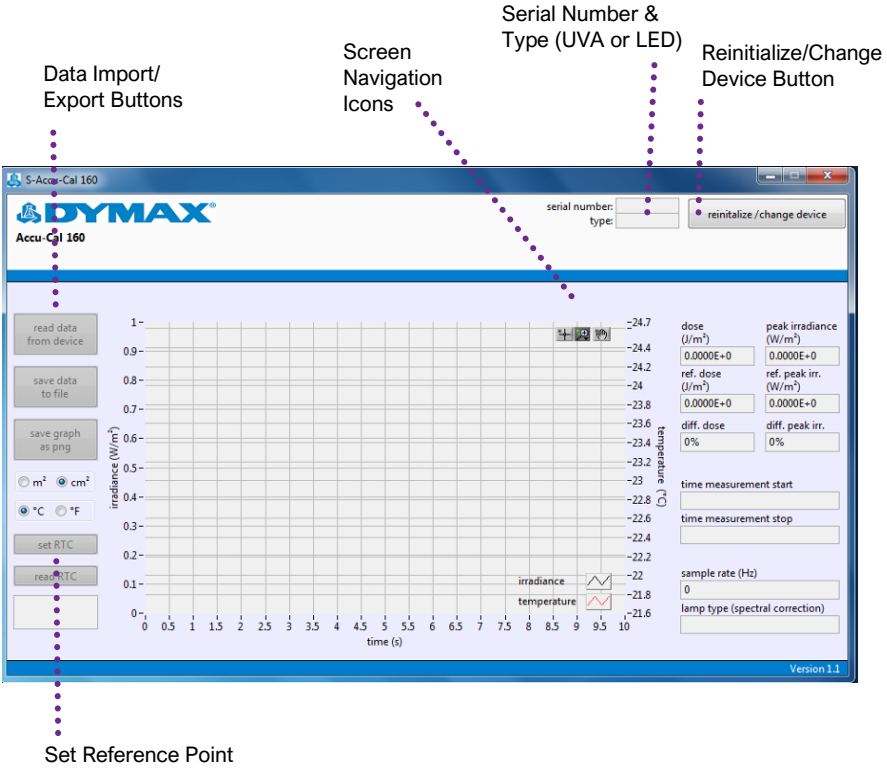
To bring the data saved in your radiometer into the software, select the “read data from device” or “save data to file” button.

- Read Data from Device: Downloads the last reading
- Save Data to File: Downloads all the data points and puts them into an excel file

Once an option has been selected, the data will be graphed on the screen. The black line represents irradiance, while the red line represents temperature. The screen navigation icons can be used to zoom in or out on specific parts of the graph. Users also have the option to save the graph as a .png file by selecting the “save graph as png” button in the data import/export buttons.

Users have the option to set a reference point using the “set RTC” button. The reference point would be the value achieved when the process is working perfectly. The software would then compare the measured values against the reference point to see how much variance there is in the process.

Figure 11.
Start Up Screen



Power Supply

The power supply for charging of the built-in lithium polymer battery is connected via the USB interface. Plugging in a USB cable for charging of the battery is only permitted for temperatures above 0°C (32°F). For charging the battery, a computer or, as an alternative, a standard USB power supply (rated voltage: 5VDC) can be used. Please use the provided USB cable or a high-quality replacement with a sufficient cross-section of the wires otherwise charging might be impaired due to too high voltage drops along the cable length.

Maintenance

Cleaning

CAUTION! *While cleaning, ensure the cleaning agent does not penetrate into the device. This can lead to short-circuiting or device operation errors.*

Do not use abrasive cleaning agents to clean this device. Off-the-shelf, non-abrasive cleaning agents or isopropanol can be used to clean the metallic surface of the device. Do not use acetone as this might damage the display.

The input optics (diffusor) can be cleaned using a clean, soft, and lint-free optical cloth soaked in isopropanol. Avoid getting fingerprints on the input optics. Fingerprints must be removed before using the device. While cleaning, be sure to not damage or scratch the input optics. Damage or scratches can cause the device to malfunction.

Maintenance/ Calibration

The ACCU-CAL™ 160 is calibrated prior to shipment with standards traceable to national and international standards. The calibration of the device is confirmed by the supplied calibration certificate.

This radiometer should be calibrated annually to ensure proper operation and readings. Only trained and authorized persons are permitted to open and repair the device. Opening the device on the input-optics side voids the calibration. Contact Dymax for calibration assistance.

Specifications

Property	Specification
Part Numbers	**41590** UVA Model **41585** LED Model
Data Display	Graphical LCD with backlight, 128 x 64 px
Wavelength Range	328 nm – 382 nm (UVA Model) 350 nm – 460 nm (LED Model)
Cosine Error f_2	<10% typical
Measurement Ranges	1.0 mW/cm^2 to 10 W/cm^2
Temperature Sensor Range	-55°C to 125°C (-67°F to 257°F)
Internal Temperature Range Operating and Storage	-10°C to 60°C (14°F to 140°F) (exposure to temperatures above 80°C/176°F voids the warranty)
Power Supply	via USB interface (Mini-B), 5 VDC, 500 mA Lithium polymer battery, charged via USB interface
Typical Battery Life	10 hours (backlight on, no operation) 6 hours (backlight on, full operation) longer battery life with backlight off (backlight is switched off automatically during measurements)
Microprocessor	16 bit, 25 ns/400 ns instruction cycle time
Analog-Digital-Converter	16 bit SAR
Dimensions (D x H)	4.63" x 0.5" (117.6 mm x 12.7 mm)
Integral Sensors	1

CE RoHS Compliant

Warranty

From date of purchase, Dymax Corporation offers a one-year warranty against defects in material and workmanship on all system components with proof of purchase and purchase date. Unauthorized repair, modification, or improper use of equipment may void your warranty benefits. The use of aftermarket replacement parts not supplied or approved by Dymax Corporation, will void any effective warranties and may result in damage to the equipment.

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