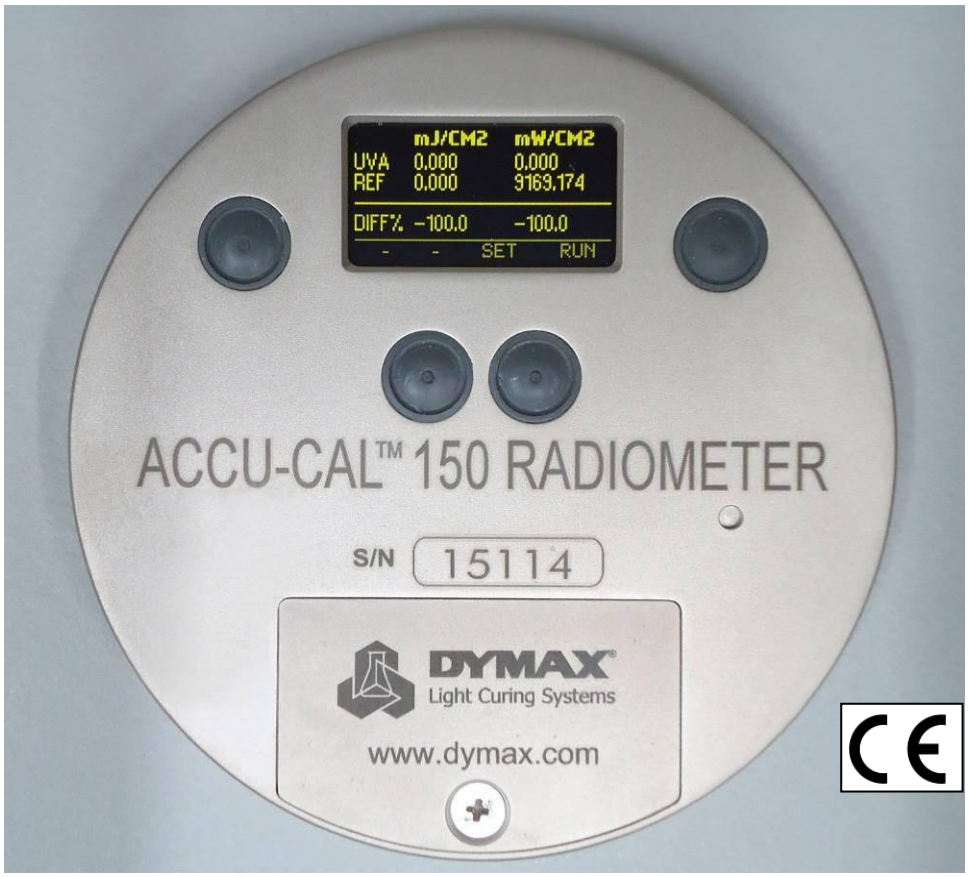
Dymax ACCU-CAL™ 150 User Guide

UV Radiometer

- Instructions for Safe Use
- Setup and Operation
- Maintenance
- Ordering Spare Parts and Accessories



ACCU-CAL™ 150 Radiometer (PN 40550)

About Dymax

UV/Visible 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 fluid 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.

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 insure that desired performance criteria are satisfied. Dymax is willing to assist users in their performance testing and evaluation by offering equipment trial rental and leasing programs to assist in such testing and evaluations. Data sheets are available for valve controllers or pressure pots upon request.

Contents

Introduction

The enclosed ACCU-CAL™ 150 Radiometer was developed and manufactured by the Dymax team, driven by a desire to best serve your needs. Before shipping, your ACCU-CAL™ 150 radiometer was calibrated and tested against standard UV light sources to ensure accurate performance.

The operation of this radiometer in conjunction with a UV light-curing system will maximize safety and user-friendly performance and provide optimum yield of your technological process.

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

Par conséquent, nous vous encouragez a lire, comprend, et suivre tout sécurité et instructions d'opération et conseillations rédiger dans cette et autre manuels etablir un lien avant de mettre en place et de faire marcher cette nouveau système de lampe de tache ou cettes composants individuel.

If you encounter a problem, have any questions, or would like to help us with your suggestions or recommendations, please contact our Application Engineering or Customer Service Departments at 860-482-1010. Trained Dymax professionals are standing by to serve you.

Si vous rencontrez un problème, avait n'importe de questions, ou si vous voudrez de nous aider avec tes suggestions ou conseillations, s'il vous plait contacte notre departements technique ou service client à 860-482-1010. Dymax formé professionals attendre a vous servir.

Safety

General Safety

Before continuing, please read the following chapters for safety recommendations and installation, running, and troubleshooting instructions.

CAUTION! *Always wear protective goggles or a face shield when working near the front of any unit which emits UV light! The rear of some units also emits stray UV light.*

WARNING! *Always observe safety requirements!*

PRÉ-CAUTION! *Toujours faisez de l'usage des lunettes de protection ou protéger de visage marche près du devant d'élément!*

PRÉ-CAUTION! *Risque de décharge électrique quand le couvert est enlever!*

ACHTUNG! *Tragen Sie immer eine Sicherheitsbrille oder einen Gesichtsschutz, wenn Sie nahe an der UV Lichtquelle arbeiten. Die Rückseite des Gerätes emittiert gestreutes UV Licht!*

WARNHINWEIS! *Bitte beachten Sie immer die Sicherheitshinweise!*

Safety

The ACCU-CAL™ 150 radiometer is designed to be used in conjunction with Dymax UV light-curing equipment that is properly set up, with components correctly connected, and operated in accordance with relevant instructions.

Safety Recommendations

- When working with UV light sources, use the goggles provided or a face shield approved for UV protection of your eyes.
- Long-sleeved shirts or lab coats are recommended to protect the arms and the use of UV opaque gloves will protect the hands.

Sécurité

L'équipment ètre concu pour ètre utilisé correctement constituer, avec composants brancher correctement, et marché en conformément avec instructions important. Le plan étais developer pour render au maxime opérateur sécurité et minimiser expositon à ultraviolette.

Recommander de Sécurité

- Emploi lunettes, ou un protéger de visage pour protection de ultraviolet pour protéger vous oeux.
- Chemises à manche long ou manteau de labo sont recommander pour protéger les bras et utilisation de ultraviolette gants opague vais protéger les mains.

Sicherheitshinweise

Dieses Gerät wurde so entwickelt, dass es nur vollständig, alle Komponenten korrekt miteinander verbunden, in Übereinstimmung mit relevanten Instruktionen betrieben wird. Bei der Entwicklung wurde weiterhin großen Wert auf die Benutzersicherheit und minimale UV Belastung gelegt.

Sicherheitshinweise

- Tragen Sie immer die mitgelieferten Sicherheitsbrille oder speziellen Gesichtsschutz, der Ihre Augen vor UV Licht schützt.
- Wir empfehlen Langarm - Hemden oder einen Laborkittel zu tragen, um die Arme zu schützen. Für die Hände empfehlen wir UV- geblockte Handschuhe.

BITTE BEACHTEN SIE: Durch den installierten inneren Filter strahlt die ACCU-CAL™ 150 und sichtbares Licht aus. Schauen Sie deshalb niemals direkt in die Lichtquelle, wenn das Gerät angeschaltet ist.

Product Overview

Description of the ACCU-CAL™ 150 Radiometer

The Dymax ACCU-CAL™ 150 UV Radiometer measures and displays the total UV energy and UV irradiance of a UV light-curing system. Its compact size and robust design withstands the extremes of UV light-curing environments while providing accurate measurement.

The carefully designed optical sensing system measures the wavelengths that are relevant to the UV process. The output of the sensing system is converted to digital form and displayed on an easy-to-read LED display.

The ACCU-CAL™ 150 measures ultraviolet wavelengths defined as UVA (320-390 nm), and displays those readings as total energy and dosage.

Environmental Considerations

- Optical measurement instruments 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™ 150 immediately after moving it from a cold to a warm environment. Under certain circumstances, condensation could develop that may cause inaccurate measurement results. Allow the device to adjust to room temperature before use.
- Do not use the ACCU-CAL™ 150 in powerful magnetic, electromagnetic, and electrostatic fields. These disturbances may influence measurement results.
- Do not expose the ACCU-CAL™ 150 to temperatures exceeding 65°C during an exposure run. Exposure to temperatures exceeding 80°C will cause unit failure and will void the warranty.

Installation

Unpacking and Inspecting Your Shipment

When your radiometer arrives, inspect the box and immediately notify the shipper of any box damage.

Open the box and check for equipment damage. If parts are damaged, notify the shipper and submit a claim for the damaged parts. Contact Dymax so that new parts can be shipped to you immediately.

Check that the parts included in your order match those listed below. If parts are missing, contact your local Dymax representative or Dymax Customer Support to resolve the problem.

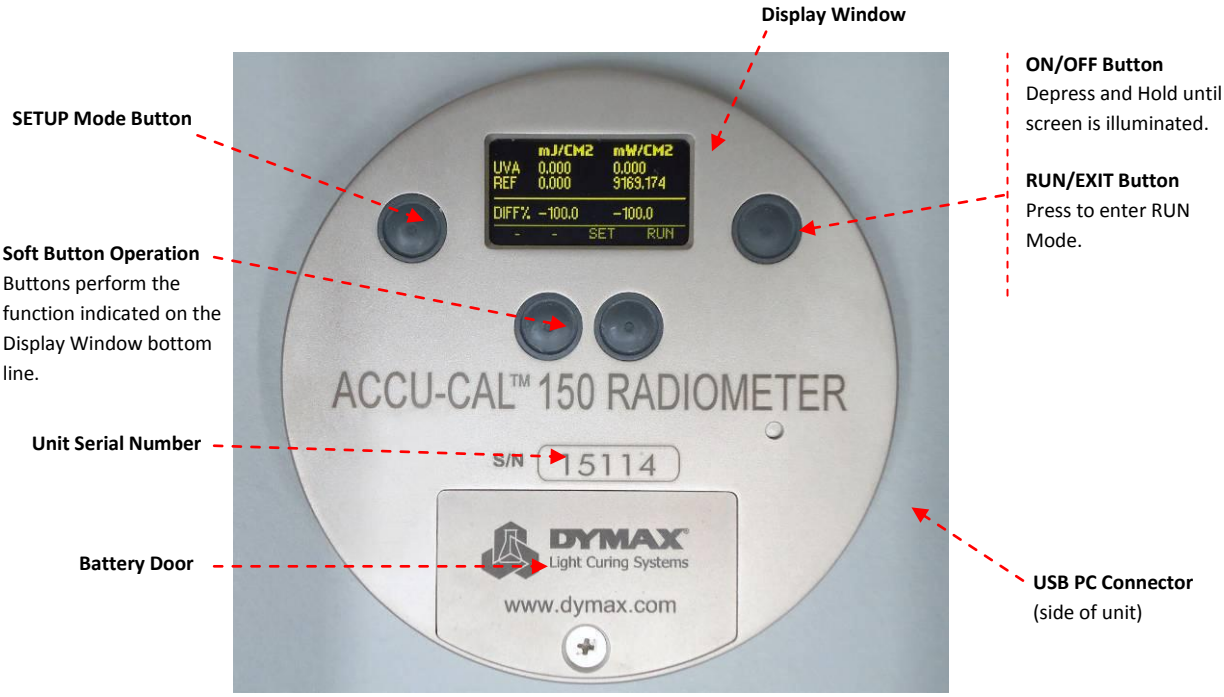
Figure 1. ACCU-CAL™ 150 Radiometer (PN 40550) (shown in carrying case (included))

Parts Included in the ACCU-CAL™ 150 Radiometer

- ACCU-CAL 150 Radiometer
- Carrying Case
- ACCU-CAL 150 Radiometer User Guide

Operation

Figure 2. ACCU-CAL™ 150 Radiometer Face Plate



1. **Turning ON the radiometer:** Press and hold the ON/OFF button until the Window Display illuminates. The Window Display will briefly show the radiometer model name, serial number, software version, date of calibration, range, and wavelength band installed. Continuing to depress the ON/OFF button at startup will display the startup information until the ON/OFF 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.

2. **Turning OFF the radiometer:** Press and hold the ON/OFF button. A tone will sound. When the tone stops, release the button. The unit will turn off.

3. **Entering RUN mode:** A short press of the RUN/EXIT Button clears the memory and puts the unit in RUN mode. The Display Window shows "RUNNING" after quickly displaying the internal temperature of the unit. Confirm that the unit shows "RUNNING" before initiating a reading.

4. Place the radiometer on the belt or object with the Optic Window (Figure 3) looking toward the UV source. The Display Window and buttons will be facing away from the UV source. When the radiometer exits the curing chamber, the Display Window will still be flashing "RUNNING".

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

5. **Exiting RUN mode:** A short press of the STOP button (Soft Button display bar indicates STOP next to the ON/OFF Button) will exit RUN mode and will return to the same default mode prior to making the exposure run, but will show the new value.

Figure 3. Optics Window (Located on the Backside of the Radiometer)

Setup and Default Modes

To enter SETUP mode, press and hold the SETUP Mode Button located to the left of the Display Window for 0.5 second, then release. The Display Window will show the current settings. Default modes will appear with an asterisk (*) before them. The Display Window below shows all possible choices for setup of each mode.

Figure 4. ACCU-CAL™ 150 Display Window (Run Mode)

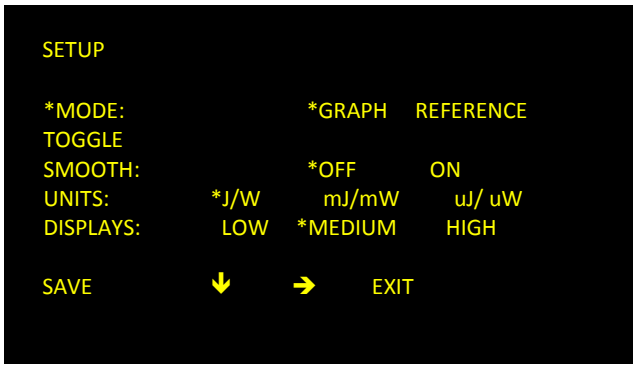


Figure 5. ACCU-CAL™ 150 Display Window (Setup Mode)

To change selections, use the buttons under the down 🡻 and right 🡺 arrows to scroll in the indicated direction. To change the default selection, select the correct line, then select the setting on each line. Press the SAVE button to save the setting as the new default. An asterisk (*) will appear next to the setting. When changes are completed, press the EXIT button to return to the default mode.

Explanation of Settings

Mode:

- **Toggle –** Pressing the selection button, the user can "toggle" between GRAPH mode and REFERENCE mode.
- **Reference –** Make a run, data will appear next to the UV band.

  CAUTION: *Be sure you want to overwrite the current data on the REFERENCE line before pressing SAVE.*

  Press SAVE. The data is transferred to the REFERENCE line and will remain until it is overwritten. The difference or change between the current run data and the reference data is displayed as a percentage change on the DIFF% line of the display window while in RUN mode (Figure 5).
- **Graph** – Illustrates the irradiance profile for the UV source(s). UV data is stored and displayed as a graph of time (X axis) vs. intensity (Y axis) for each UV lamp source.

Smooth:

- **OFF –** Displays the peak irradiance as measured at 2,048 samples per second.
- **ON –** Displays the peak irradiance as measured at 25 samples per second.

Units: Select the unit values (J/W, mJ/mW, µJ/ µW)

Displays: Select the display intensity (LOW, MEDIUM, or HIGH)

Save: Soft Button indicators (🡻, 🡺, and **EXIT)**

Maintenance

General Maintenance

The ACCU-CAL™ 150 was designed to operate with minimal maintenance. Follow the schedule below to ensure top unit performance.

- Calibrate the instrument at least every six months. Calibration service is available through Dymax Customer Service or Dymax Product Repair.
- Change the batteries when a low battery warning is received. The ACCU-CAL™ 150 uses two AAA-type batteries. The battery compartment is on the front of the instrument.
- Keep the detector head's sensing element clean and free of contaminants. The detector head may be cleaned with a clean tissue wetted with isopropyl alcohol.

Cleaning and Calibration

NOTE: *Cleaning the Display Window too often can cause calibration problems. Use caution when touching the mirrored surface.*

Display Window Cleaning Instructions

Use a soft cloth to clean the Display Window. Use of isopropyl alcohol is acceptable.

WARNING: *Do not use acetone to clean the Display Window. It may damage the Display Window.*

Optics Window Cleaning Instructions

The following guidelines are for cleaning the optical surfaces on Dymax instruments. However, Dymax cannot have full knowledge of contaminants present in all applications and as a result cannot test for their effects. Therefore, we cannot assume responsibility for damage to customer instruments, which results from following these directions once the warranty period has expired. Customers are advised to obtain and read the MSDS for any chemical used for cleaning optics and for taking necessary precautions. Dymax makes no claim for the safety of any of these chemicals.

STEP 1. LOOK

Closely examine the surface of the optics. If no contaminant is visible, it is best not to clean the instrument. The optics are delicate and handling should be minimized. The two exceptions to this rule are when:

- A process chemical has come in contact with the instrument's optics, or
- A shift in readings has been observed with the instrument and the design of the UV light-curing system is such that contamination of the radiometer is a possible cause of the measurement error.

STEP 2. BLOW

Use compressed gas to remove any loose material from the surface of the optics. This step is necessary because loose material, especially silicates and other abrasive components can cause scratching of the optics during the remaining steps. Compressed gasses we recommend, in order of preference, are:

- Dry nitrogen
- Chemtronics® Duster (PN ES1017, ES1217, ES1617) or similar tetrafluoroethane-based products
- A rubber air bulb (typically found in camera supply shops)
- Compressed air from an oil-free, instrument-grade system, sometimes referred to as instrument air

In the case of any compressed gas, it is best to avoid making the Optic too cold. The resulting condensation, while typically easy to remove, presents added difficulty in the cleaning process.

NOTE: Blowing on the optics with the mouth is not recommended. Various components of saliva are extremely difficult to remove from the optics. Using ordinary compressed air (sometimes referred to as shop air) should also be avoided because of the difficulty in removing oil from the optics.

STEP 3. FLOOD

Apply a liberal amount of solvent to the Optics Window. The purpose of the solvent is to loosen the contaminants from the surface so surface tension can remove the contaminant in Step 4. The solvents used depend on what the user has available and what contaminants are expected in the field. EIT Instrument Markets recommends cleaning the optic once with isopropyl alcohol and once with acetone for best results.

WARNING: *Do not use acetone on the Display Window.*

Other suitable solvents for cleaning the optics include de-ionized water, methyl alcohol, and ethyl alcohol. Customers working with non-polar chemicals may find Methyl-ethyl-ketone (MEK) to be an effective solvent. Customers should avoid using solutions containing detergents.

STEP 4. WIPE

Using a lint-free wipe or a cotton swab, wipe the optical surface clean. Either the wipe or swab needs to be thoroughly wet with the solvent so the surface tension of the solvent will allow the contaminant to be captured on the wipe. Users may find it convenient to start again at Step 3 with a second solvent. A source for lint-free wipes is Kimberly Clark, Inc.'s Kimwipes®.

Dymax does not recommend wiping the optical surface with a dry wipe or swab of any kind. The absence of solvent greatly increases the chance for the optical surface to be abraded.

Dymax can provide cleaning advice, assistance, and repair or replacement in cases where these guidelines fail to remove contaminants. Following these guidelines will help customers get long life and accurate readings from their radiometers.

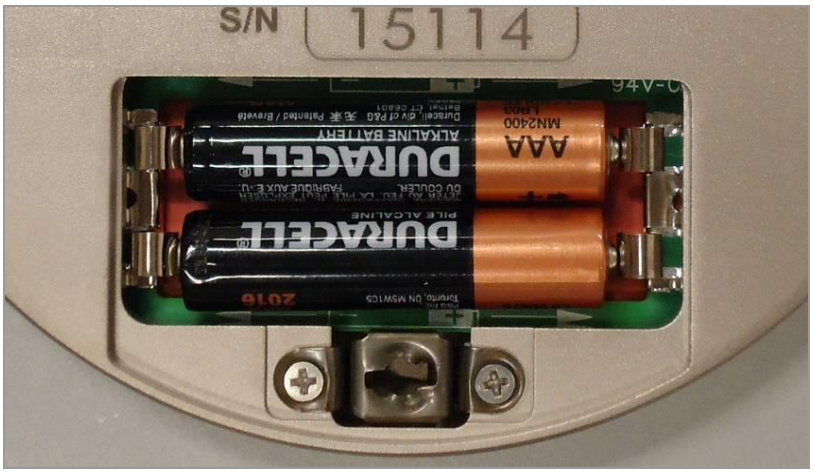
Dymax recommends that ACCU-CAL™ 150 be calibrated every 6 months.

Battery Replacement

NOTE: The ACCU-CAL™ 150 should be turned OFF before the batteries are replaced.

- Loosen the screw on the Battery Door and remove the door.
- Remove the old batteries.
- Install two new AAA-size alkaline cells, observing polarity. Both cells are installed in the same direction (Figure 6). The proper direction is indicated on the PCB and on the housing inside the battery compartment. The unit is designed so it will not operate with reversed cells.
- Replace the Battery Door and the screw.

Figure 6. Direction of Batteries



Diagnostics and Error Messages

The ACCU-CAL™ 150 radiometer continuously conducts internal self-diagnostics. If the unit detects an internal problem, it will display one or more of the following error codes in the upper left corner on the display. Error codes are two alphanumeric characters proceeded by an asterisk (*). If two errors are experienced at the same time, both error codes will flash alternately on the screen every 0.5 seconds. Certain error codes may indicate problems that require returning the unit to the factory for service.

- **Low Battery Indicator (*LB – Low Battery)**

  If this happens during an exposure run, the reading is still valid. The low battery indicator is designed to illuminate early enough so that your data remains valid. Under severe low battery conditions, the unit does not operate. Therefore, confirm that the unit flashes “RUNNING” before initiating a reading.

- **Over-Temperature State (*OT – Over Temperature)**

  If the internal temperature of the ACCU-CAL™ 150 exceeds 65°C during an exposure run, the unit will emit a steady beeping tone after the run. However, the data it has collected is accurate and can be read by pressing the select button. When doing this, the beeping tone stops and you can scroll through the data readings. In addition, if the internal temperature of the unit exceeds 75°C, the unit beeps once then displays the internal temperature continuously. The unit will not operate until the internal temperature drops below 75°C. The maximum internal temperature is 80°C. If the internal temperature exceeds 80°C, the warranty is voided.

  CAUTION: *If you press the reset button to initiate RUN mode before the unit cools to 75°C, all data from the previous exposure run is cleared from memory. The unit beeps and again continuously displays the temperature.*

- **Over Range State (*OR – Over Range)**

  The over range error message will be displayed if the peak irradiance value is too large for the instrument to measure. Note that a unit’s full scale range will be marginally higher than the normal range. Readings that exceed the nominal range and do not result in an *OR error are valid.

- **Other Error Codes**

  For all other error codes, please contact Dymax for assistance.

Spare Parts and Accessories

Radiometer Communications Software Kit (PN 40629)

Installation and operating Instructions for ACCU-CAL™ 150 Radiometer Communication Software (USB PP2 V.2.00)

The software has been designed for computers running Windows 2000, XP, and Vista and will not work with Windows 95, 98, or NT.

Installing the Software

Auto Run

1. Insert the Communication Software CD into your CD-Rom drive.
2. If AUTO RUN is set to ON for your CD drive, the program will begin loading automatically. Click on the FINISH and/or NEXT buttons until installation in complete.

Manual Installation

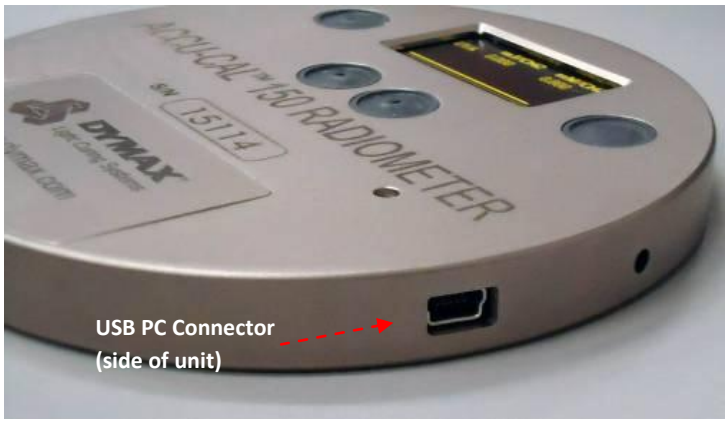
If AUTO RUN is not turned on, follow the steps below:

1. Click on the START Button on your Windows toolbar.
2. Click on RUN.
3. Click on BROWSE.
4. Select the drive where the CD Installation Disk is located.
5. Select the setup.exe file and double-click it.
6. Follow the on-screen prompts by clicking on the FINISH and/or NEXT buttons until installation is complete.

Data Screen Button and Display Functions

The ACCU-CAL™ 150 Radiometer can be connected directly from the USB PC Connector (Figure 7) on the side of the Radiometer to a USB Port on your PC via the supplied USB Cable.

Figure 7. USB PC Connector



The Radiometer must be connected and turned on before transferring data.

- **Get Data** - Click this button to transfer the collected data from the Radiometer to the PC.

  This will display the UV band and the corresponding energy density (mJ/cm^2) and peak irradiance (mW/cm^2) data for each band in the appropriate columns.

- **Save** - Click this button to save the collected data displayed on the Screen. A window will appear labeled APPEND/NEW. The data can be saved as a new file or appended to a previous file.

- **New File** - Data will be saved in a new file. The dialog box will start at the last folder where ACCU-CAL™ 150 data file was saved. The default is the current user's My Documents folder.

- **Append File** - Will open a dialog box and display the name of the last file saved. Selecting YES will append the last readings to that file; selecting NO will allow another filename to be selected. Note that a new file created with the append command will not have a row of labels to identify the data in each column.

  NOTE: It is recommended to choose filenames which end in .csv. This will allow Microsoft Excel to open the file directly and format it for easy review.

- **Set Up** - Click this button to select the PC Port. Scroll up or down with the arrows to select the desired Port and then click on Exit.
- **Exit** - Click this button to close and exit the PP2 software.
- **Unit Information** - Identifying information added to each data collection for documentation purposes. This is useful for users of multiple radiometers and for appending multiple readings when creating a data logging file.

  Each time the GET DATE Button is clicked, the Radiometer's model and serial number are updated. The time and date stamp are from the PC Clock when GET DATA was pressed.

- **User Notes** - Any information added in this block by the end user will be retained and attached to the date for further reference. Avoid using commas, the tab key, or the enter key in this box.
- **Error Messages**

  Error 37: Incorrect Serial Port selected. Go to SET UP and select the correct Serial Port number.

  Error 43: Appears if operator cancels a SAVE FILE request. Click CONTINUE to return to the Data Screen. If STOP is clicked, the program may return to the Data Screen where an arrow icon appears at the top. Click on the arrow icon to return to the Data Screen.

Software Distribution Requirements

By using this software, end users agree to not:

1. Reverse engineer, decompile, or disassemble the software (except to the extent such foregoing restriction is expressly prohibited by application law);
2. Sub-license, lease, or rent the software;
3. Distribute in part, modify, or create derivatives of the software;
4. Amend, modify, or supplement driver interface software with any additional code except for the purpose of further configuring the drive interface software for use with National Instruments Corporation; and
5. Directly or indirectly, export, re-export, download, or ship the software in violation of the laws and regulations of the U.S.A.

Specifications

Property	Specification
Display	Easy-to-read yellow text on black background
Range	10 Watt: UVA (320 – 390 nm)
Accuracy	+/- 10%; +/- 5% typical
Spectral Response	Approximately cosine
Spectral Ranges	1-channel continuous monitoring; 320-390 nm (UVA)
Operating Temperature	0-75°C internal temperature; tolerates high external temperatures for short periods (audible alarm indicates when temperature has exceeded tolerance)
Time-Out Period	2-minute DISPLAY mode (no key activity)
Battery	Two user-replaceable AAA alkaline cells
Battery Life	Approximately 20 hours with display on
Dimensions (D x H)	4.60" x 0.50" [11.7 cm x 1.27 cm]
Weight	10.1 ounces (289 grams)
Instrument Materials	Aluminum, stainless steel
Carrying Case Material	Cut polyurethane interior; scuff-resistant nylon exterior cover
Carrying Case Weight	9 ounces (260 grams)
Carrying Case Dimensions (W x H x D)	10.75" x 3.5" x 7.75" [27.4 cm x 8.9 mm x 19.7 cm]

CE

Warranty

IMPORTANT NOTE: *DYMAX CORPORATION RESERVES THE RIGHT TO INVALIDATE ANY WARRANTIES, EXPRESSED OR IMPLIED, DUE TO ANY REPAIRS PERFORMED OR ATTEMPTED ON DYMAX EQUIPMENT WITHOUT WRITTEN AUTHORIZATION FROM DYMAX. THOSE CORRECTIVE ACTIONS LISTED ABOVE ARE LIMITED TO THIS AUTHORIZATION.*

New Product Warranty

The manufacturer warrants that all goods described in this manual (except consumables) shall be free from defects in material and workmanship. Such defects must become apparent within six months after delivery of the goods to the buyer.

The manufacturers' liability under this warranty is limited to replacing or repairing the defective goods at our option. The manufacturer shall provide all materials and labor required to adjust, repair, and/or replace the defective goods at no cost to the buyer only if the defective goods are returned, freight prepaid, to Dymax during the warranty period.

The manufacturer shall be relieved of all obligations and liability under this warranty if:

1. The user operates the device with any accessory, equipment, or part not specifically approved or manufactured by the instrument manufacturer, unless the buyer furnishes reasonable evidence that such installations were not a cause of the defect. This provision shall not apply to any accessory, equipment, or part that does not affect the proper operation of the device.
2. Upon inspection, the goods show evidence of becoming defective or inoperable due to abuse, mishandling, misuse, accident, alteration, negligence, improper installation, lack of routine maintenance, or other causes beyond our control.
3. The goods have been repaired, altered, or modified by anyone other than the instrument manufacturers authorized personnel.
4. The buyer does not return the defective goods, freight prepaid, to Dymax within the applicable warranty period.

There are no warranties that extend beyond the description on the face hereof. This warranty is in lieu of - and is exclusive of - any and all other expressed, implied, or statutory warranties or representations. This exclusion includes merchantability and fitness, as well as any and all other obligations or liabilities of the instrument manufacturer, and the manufacturer shall not be responsible for consequential damages resulting from malfunctions of the goods described in this manual.

No person, firm, or corporation is authorized to assume for the manufacturer, any additional obligation or liability not expressly provided for herein except in writing duly executed by an officer of the manufacturer. If any portion of this agreement is invalidated, the remainder of the agreement shall remain in full force and effect.

This warranty shall not apply to any instrument or component not manufactured by the manufacturer of this product.

Calibration and Repair Warranty

Dymax will warranty calibration and/or repair services just performed for 90 days. This Calibration and Repair Warranty does not apply to nor cover repairs that may otherwise occur to the instrument. Such repairs may be covered under the New Product Warranty based on the age of the instrument.

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