Production **A**mbient **L**ight **M**easurement

PALM Probe®

Features

- Wide Dynamic Range (100,000:1) Measurements; Autoranging and zeroing
- Measures and displays Watts, Joules, Seconds; displays peak value Watts/cm^2
- Electrically isolated and insulated Light Guide
- Very high temperature resistant Light Guide
- Single hand operation; two membrane switch control
- UV bands- choice of EIT UVA, UVB, or UVV
- Battery powered; two user replaceable AA batteries with low battery warning

Applications

- Measure UV system performance particularly in applications where measurement space is limited or it is difficult to access
- Establish, document and maintain UV process windows
- Meet ISO, quality and customer requirements for SPC/SQC
- Verify readings from on-line sensors; coordinate relative percentage type readings from on-line displays to absolute units
- Multiple uses from production curing (high irradiance) to stray hazard (low irradiance) applications

Introduction

The PALM Probe radiometer from EIT addresses UV Measurement and Process Control in areas where it has been difficult to pass a radiometer through the process. The use of UV inks and coatings has grown in label and web markets and the PALM Probe offers safe, reliable measurement for these and other applications.

The word PALM is an acronym for **P**roduction **A**mbient **L**ight **M**easurement. The PALM Probe has an extremely wide dynamic range allowing it to read from very low levels of UV light as in fluorescent bulbs to very high levels of UV found in powerful UV curing systems. The physical conditions inside a UV curing chamber are harsh. An instrument must withstand wide temperature variations. A tremendous amount of electrical energy is used to excite the UV bulb. The PALM Probe is designed to withstand the harsh physical conditions of the UV curing chamber as well as protect the operator and instrument from damage or electrical shock. Potentially lethal voltages exist in UV curing systems. Although the Light Guide has been designed to reduce the risk of shock, the user should avoid contact with the high voltage areas in the UV housing. The user holds the Probe Body of the instrument and inserts the Light Guide under the UV source.

Operation

Ultraviolet, visible and infrared light radiation of all wavelengths impinge on the Input Aperture at the tip of the PALM Probe Light Guide. The light is directed down the

Light Guide to the base of the Probe body where the UV filter passes the UV light of interest to the photodetector. The photodetector converts the light energy to a current that is proportional to its intensity. The signal is conditioned, digitized, processed and displayed on the LCD of the PALM Probe.

The Light Guide is constructed out of steel alloy and coated with a non-conductive ceramic coating to insulate and protect the user from accidental shock while taking measurements. The Light Guide is further isolated from the Probe Body by a non-conductive Delrin block. The Probe Body contains the optics, electronics, battery and display functions of the unit. The Probe Body can be held either with an 'over' or 'under' hand type of grip. The raised membrane switches are easy to operate with either hand.

The PALM Probe has a very wide dynamic range that automatically adjusts itself for the user. For example, the PALM Probe can measure light from approximately 100 microWatts/cm^2 (μW/cm^2) up to 10 Watts/cm^2 (W/cm^2). The decimal point in the LCD 'floats' over three places to cover the wide dynamic range on the unit

The PALM Probe display allows the user to alternate between Watts-Joules-Seconds during data collection and after a reading or run has been made. The SELECT button allows the user to toggle between the values.

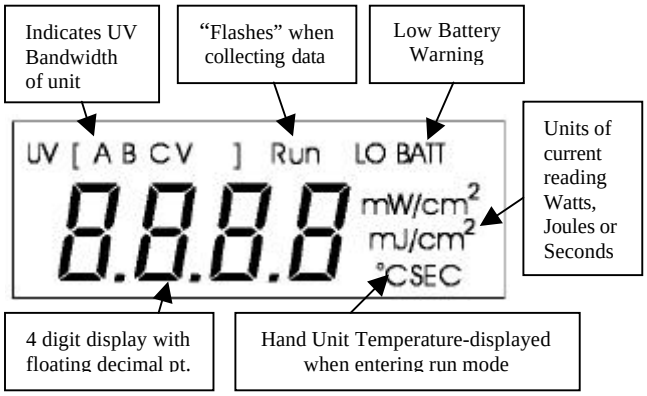
When collecting irradiance data with the PALM Probe, the display will change as the Probe changes position under the UV source. As the aperture opening moves into the focused peak irradiance area of the UV source, the reading will increase. Variations in irradiance may also be seen when the PALM Probe is moved along the length of a UV bulb. The LCD display will automatically scale and adjust as the PALM

Probe takes readings. Pressing the RUN/STOP button will stop the collection of data and the highest irradiance value measured during the collection of data will be displayed. Most users will find that the Irradiance value (W/cm^2) displayed is the most important value collected by the PALM Probe when it comes to process control for a particular application.

UV Energy Density or Dose incorporates time into the irradiance measurement. The PALM Probe displays the Energy Density or Dose value in Joules (J/cm^2) on the LCD. The dose is an integration of the area under the irradiance curve. The dose reading increases as the reading continues. The speed at which the dose increases depends on the irradiance value. Switching to the built in timer in the PALM Probe will help monitor the 'time component' of the dose reading for more consistent results. Placement of the PALM Probe in the same location is important in order to get consistent and repeatable irradiance values to calculate dose readings.

LCD Display

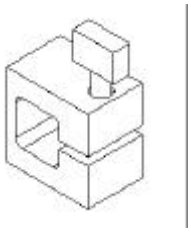
The following diagram shows all the available LCD Displays on the PALM Probe. In operation, the display is easy to read and understand as the user will only see the segments on the display that pertain to current reading.



PALM Probe Placement

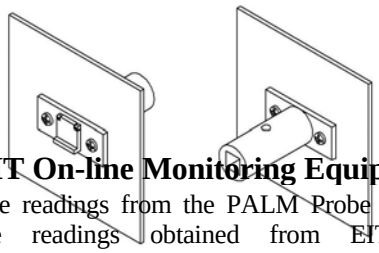
Placement of the PALM Probe needs to be in a regular and repeatable location to achieve consistent results. EIT has developed two accessories to help with this.

The first accessory is supplied with each unit and attaches over the light guide to allow it to be positioned to the same 'stop' depth each time the PALM Probe is used to take a reading.



The second accessory to help with placement of the PALM Probe is a Locator Kit. The Locator Kit is mounted on the system and allows the Light Guide to be inserted in the same location each time. The Locator Kit has been designed to mount in either direction (shown below). It is available without the hinged door.

Locator Kit Internal view left External view right



EIT On-line Monitoring Equipment

The readings from the PALM Probe can be coordinated with the readings obtained from EIT On-line monitoring instruments. When conditions are ideal (clean reflector, new UV lamps), the EIT displays can be set to read 100% UV intensity. Baseline readings of the UV intensity can be obtained with the PALM Probe. The UV will generally decrease over time as the reflectors and UV bulbs change. The readings displayed on the EIT on-line monitors can be compared to the readings on the PALM Probe. The On-line monitors can provide continuous monitoring including alarm functions and feedback information. The PALM Probe also allows users to compare readings between systems.

Specifications

Electrical Specifications	
UV Range	100 $\mu W/cm^2$-10 W/cm^2
UV Spectral Response	UVA 320-390nm, UVB 280-320nm, UVV 395-445nm
Display	LCD with 4 digits and floating decimal point
User Interface	Two raised membrane switches
Operating Temperature Range	Probe Body 0-70°C
Time-out period	10 Minutes
Batteries	Two AA Alkaline Batteries
Battery Life	25 Hours run time
Mechanical Specifications	
Overall Length	25.75" (65.4 cm)
Probe Body Length	7.5" (19.0 cm)
Light Guide Length	18.25" (46.4 cm)
Weight	21 ounces (596 grams)
Light Guide Temperature Resistance	750°F (400°C) on a continuous basis; much higher for measurement length exposures
Specifications subject to change	U.S. Patent D451,413