

# Light Meter

## Apollo 1.0 and Apollo 2.0

### OPERATING INSTRUCTIONS



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## **I. INTRODUCTION**

Apollo 1.0 and Apollo 2.0 are instruments for accurate measurements of UV-A irradiation and visible illuminance. Extra engineering effort is taken to make an accurate measurement of visible light emission from a UV-A lamp by incorporating a superior bandpass filter containing only non-fluorescent filters. The instrument provides fast measurements as it offers autoranging and concurrent measuring of visible light and UV-A irradiation. It is ergonomic and easy to use due to its lightweight chassis, a wireless sensor unit and compact size. Apollo 1.0 and Apollo 2.0 are traceable to NIST (USA's National Institute of Standards and Technology). In addition, Apollo 2.0 complies with the ISO 3059 standard.

Sensor measurements and transmission of the data is done via Bluetooth. The wireless sensor enables the user to measure from a distance of up to five meters (16 feet). This feature ensures that the sensor unit is stable, and no movement occurs from connecting cables during measurement. Each sensor unit has both the UV and white light sensors incorporated.

Apollo 1.0 and 2.0 come as a single kit or as a double kit. The single kit includes one reader unit and one wireless sensor unit. A double kit includes one reader unit and two wireless sensor units. As only the sensor needs to be sent for calibration, the double kit is a convenient tool so that operations are never disrupted. Please note that Aerospace companies that are audited by Nadcap must send in both the reader and the sensor for calibration.

## 2. OPERATION

### 2.1 Turning on Apollo

a) Turn on the Hand Unit by pressing the “Power On” button (see Figure 1).

Figure 1. Hand Unit



- b) Turn on the Sensor Unit by pressing the “Power On” button. The LED will flash once to confirm (see Figure 2). Note that the Sensor Unit will turn off automatically after 30 s if no connection to the Hand Unit was established or if the Hand Unit was switched off. In these cases, the LED flashes twice.

Figure 2. Sensor Unit



- c) The Hand Unit and Sensor Unit will now connect. A progress bar indicates the connection process (see Figure 3).

Figure 3



- d) Once the connection is established, you will see the measuring screen that shows the UV-A intensity in  $\mu\text{W}/\text{cm}^2$  as measured by the UV-A sensor of the Sensor Unit and the white light illuminance in lux as measured by the VIS sensor.

## 2.2 The main menu

The main menu is reached when pressing “Enter” (Figure 1).

Here, you have the following options:

POWER OFF

SETTINGS

SENSOR UNITS

<<<

Use the “Arrow Up” and “Arrow Down” function to navigate through the options. Press “Enter” to choose a submenu. Press <<< to return to the measuring screen. The different options will be discussed in the following sections.

## 2.3 Switching off Apollo

- a) Turn off the Hand Unit by selecting POWER OFF in the main menu.
- b) The Sensor Unit is automatically switched off 30 s after the Hand Unit is switched off. In this case, the LED flashes twice.

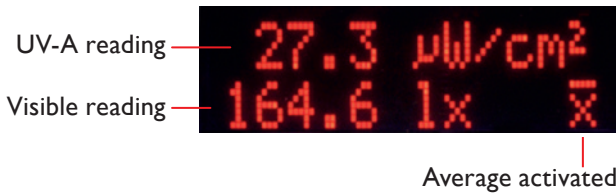
In addition, there is an automatic function which turns off the Hand Unit after 5 min if no button has been pressed.

## 2.4 Average reading function

The average reading function allows integrating over the last 10 or 25 values that are measured by the sensor.

- Select SETTINGS in the main menu. The following submenu opens  
UV-A:  $\mu\text{W}/\text{cm}^2$   
VIS: lx  
AVERAGE: OFF  
<<<
- Navigate to AVERAGE: OFF. Repeated application of the “Enter” button allows you to switch between three values (10, 25, and OFF).
- Return to the measuring screen by either pressing <<< twice or by pressing the “Peak” button once. If you chose AVERAGE: 10 or AVERAGE: 25, you will see the averaging symbol in the display (see Figure 4).

Figure 4



- If no key has been pressed for 1 min, the Hand Unit will automatically return to the main menu.

## 2.5 Change of measuring units

Measuring units for the UV intensity can be chosen between  $\mu\text{W}/\text{cm}^2$  (default) and  $\text{W}/\text{m}^2$  and units for the visible illuminance can be chosen between lux (default) and foot candles (fc).

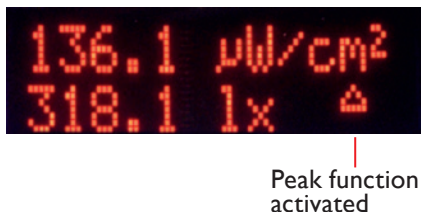
- Select SETTINGS in the main menu.
- To change the settings for the UV-intensity, navigate to UV-A:  $\mu\text{W}/\text{cm}^2$ . Repeated application of the “Enter” button allows you to alternate between the measuring units.
- To change the settings for the visible illuminance, navigate to VIS:lx. Repeated application of the “Enter” button allows you to alternate between the measuring units.

- d) Return to the measuring screen by either pressing <<< twice or by pressing the “Peak” button once.
- e) If no key has been pressed within 1 min, the Hand Unit will automatically return to the main menu.

## 2.6 The peak function

After the “Peak” button is pressed while you are on the measuring screen, the Hand Unit shows the largest measured value since the button was pressed. A small triangle can be seen in the display (see Figure 5). To deactivate the peak function, press the “Peak” button again.

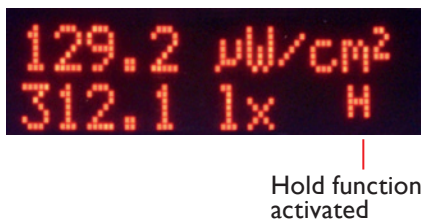
Figure 5



## 2.7 The hold function

After the “Hold” button is pressed while you are on the measuring screen, the Hand Unit will show the latest measured value and does not change. A small “H” can be seen in the display (see Figure 6). To deactivate the hold function, press the “Hold” button again.

Figure 6





### 3. PAIRING SENSOR UNITS

The Sensor and the Hand Unit are paired by the factory. Only one Hand Unit and one Sensor Unit can be paired at one time. In case of a double kit, the Sensor Unit and the Hand Unit can be paired manually.

a) Select SENSOR UNITS in the main menu.

b) You see a submenu that looks like this

D588647BB843

NEW SENSOR

<<<

The first line shows the unique ID of the Sensor Unit (12 characters, always starting with a letter) that is currently paired with the Hand Unit. The ID is printed on the label on the back side of the Sensor Unit.

c) Select NEW SENSOR. The Hand Unit it now disconnecting from the old Sensor Unit and the display reads “Scanning ...”.

d) Switch on the Sensor Unit you want to pair with.

e) A list of available Hand Units appears on the screen.

f) Select the desired Sensor Unit and press “Enter”.

g) Return to the measuring screen by either pressing <<< twice or by pressing the “Peak” button once.

## **4. TECHNICAL INFORMATION**

### **4.1 Batteries**

The active measuring time of the Hand Unit is estimated to about 100 h. If the display does not light up after pressing “Power On”, new batteries (3 x AA 1,5V) are needed. The batteries used for the Hand Unit can be replaced by the user.

The active measuring time for the Sensor Unit is estimated to approximately 600 h. If the battery is discharged and/or if the Sensor Unit is cold (below -30°C/-22°F) the LED will flash 5 times and the Sensor Unit will turn off. The battery shall only be replaced by Labino or a Labino authorized calibration center (see section 5). Batteries are changed by the factory when the spectrometer is recalibrated.

### **4.2 Operating conditions**

- a) Operating temperature: 0°C to +40°C
- b) Storage temperature: -30°C to +60°C
- c) Relative humidity: 5% to 95%, noncondensing

### **4.3 Relative spectral response**

The wavelength dependence of the relative spectral responsivities of the Apollo 1.0 and 2.0 UV-radiometers are shown in Figure 7. The relative spectral response of Apollo 2.0 fulfills the requirements of ISO 3059 which are:

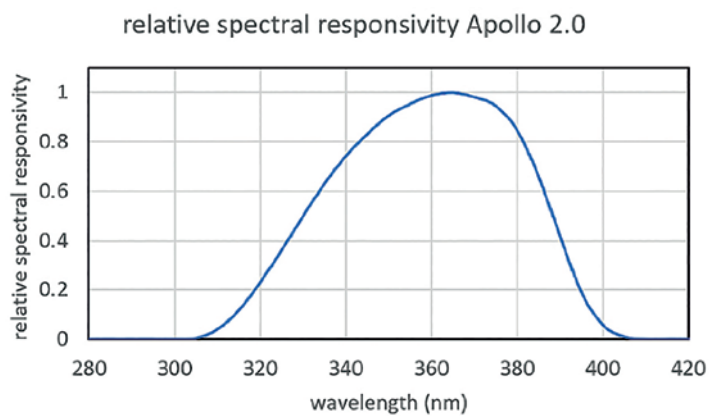
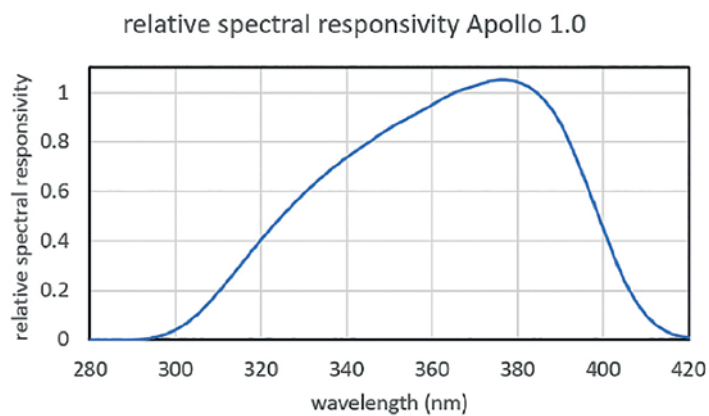
- a) the relative spectral response shall not exceed 105% for any wavelength;
- b) the peak relative spectral response shall occur between 355 nm and 375 nm;
- c) the relative spectral response at a wavelength of 313 nm shall be less than 10%;
- d) the relative spectral response at a wavelength of 405 nm shall be less than 2%.

## **5. CALIBRATION**

The recommended calibration interval is six months and is done by Labino or a Labino authorized calibration center. These centers can be found online at [www.labino.com](http://www.labino.com).

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Figure 7.  
Relative spectral responsivities of the Apollo 1.0 and  
the Apollo 2.0 UV-radiometers



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