SOLAR®
LIGHT

USER MANUAL

DCS-2
Dose Controller/Meter

For SPF Testing using the
Model 16S
Simulator

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Model Number: DCS-2

DCS-2 Rev. 3 January 2015

1 Warranty

SOLAR LIGHT COMPANY, LLC. herein referred to as "Solar Light" warrants that the equipment has been carefully tested, inspected and shipped from the factory in proper working condition, free of visible defects. Solar Light warrants the equipment to be free from defects in material and workmanship, under normal use and operation, for a period of one (1) year from date of shipment. Stocking distributors will have eighteen (18) months from the date of shipment from the Factory or one (1) year from installation date whichever occurs first.

The warranty is limited to the replacement of defective parts including labor during the first year, FOB factory, Philadelphia. Shipping cost to Solar Light is the customer's responsibility. Solar Light will pay return shipping costs. Solar Light reserves the right to replace defective parts with new or rebuilt parts at their discretion. Defective parts replaced under this warranty shall become the property of Solar Light.

This warranty is subject to the following conditions:

1. Solar Light equipment must be purchased from an authorized Solar Light representative.

2. Solar Light must supply all repairs and maintenance parts used during the warranty period and the factory must perform all service work or it must be done by an authorized Solar Light field service representative or directly.

3. The equipment must be operated within Solar Light's specifications and in accordance with the operating and preventive maintenance instructions.

4. This warranty is non-transferable.

The warranty shall not apply to damages resulting from errors in installation, nor shall it apply to any equipment, which has been subjected to damages, alterations or misuse by the purchaser or freight carrier. Parts of the equipment that would be generally considered normal wear and tear maintenance items are not covered under this warranty.

If the lamp explodes, it may be replaced at the manufacturer's discretion, but derivative damages will not be covered. Only lamps obtained through Solar Light can be warranted. Explosion debris must be returned to Solar Light.

Before shipping equipment back to Solar Light for warranty service, we require that you contact Solar Light for our Return Material Authorization (RMA) procedures.
Unauthorized returns will not be accepted and shipments will be returned to the sender at their expense.

Solar Light must accept any variations to the above warranty in writing prior to equipment purchase, for it to be valid.

This warranty is subject to change without notice.

2 General Description

The DCS-2 Dose Controller/meter is a bench model Dose controller and Radiometer for use with the Solar Light Company range of Solar Simulators. It continuously monitors the intensity and the dose being delivered to the subject. When the dose or time is reach the pre-set value, the shutter automatically closes, terminating the UV irradiation. Either UVA or Erythema UV (also referred to as Sunburning UV (SUV) is monitored by one of the two sensors supplied.

The DCS-2 has a capacitance touch screen for easy operation and an intuitive color screen set enable set up and test control with fewer keystrokes. Several preset menus are included for running standard tests, and a keypad screen is included to set up custom tests as required. Many features such as last run memory, automatic sequence setting, pause and resume or pause and reset are also included to facilitate faster more efficient testing.

The DCS-2 will work with all models of Solar Light Company's simulators to carry out a wide range of different tests. These are SPF testing, Pre irradiation, PV Cell testing, Materials testing and Biological testing. It has the same unique, patented automatic sensor identification capability found in the PMA series products, and is compatible with all the PMA21xx series sensors.

NOTE: This manual is intended to cover all the functions in specific tests, using any of our simulators. If a button is "grayed out" and inactive when pressed, it means that the function is not applicable to the chosen simulator.

3 Operation

This unit is for use with Solar Light Company's Model 16S series Solar Simulators.

3.1 DCS-2 Indicators

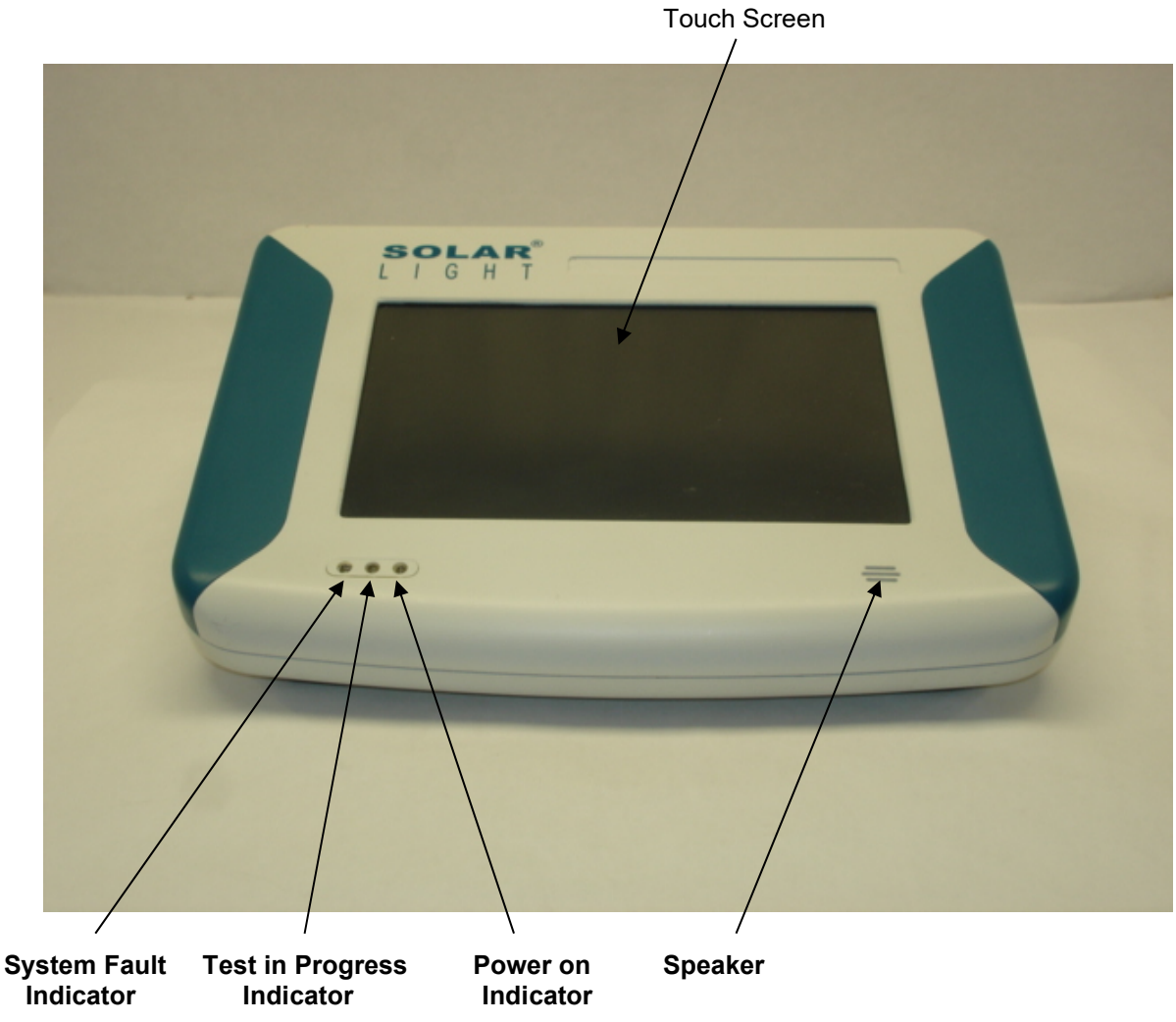
System Fault: Shutter is not being controlled.

Test in Progress: Flashes when test is in progress

Power on: Lit when power supply is connected

Speaker: Gives audible signals when functions are completed

3.2 Front Panel Details



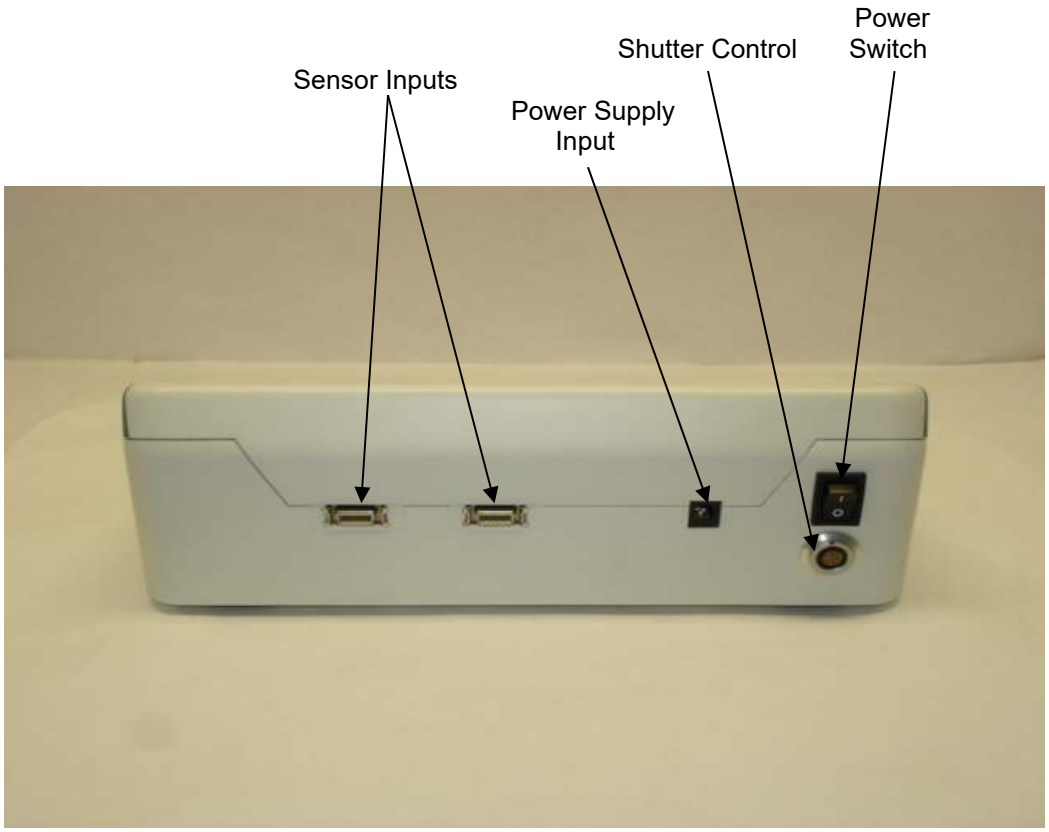
3.3 Rear Panel

Power switch: Controls the application of power to the DCS-2. This powers the internal control circuits.

Shutter Control Connection: control cable to simulator: The eight pin circular connector on the rear panel allows remote control of the simulator's shutter. When connected, the shutter can be controlled in dose delivered mode or a timed exposure mode.

Sensor inputs: Connect one or two sensors simultaneously if desired, depending on application. One sensor must always be connected. Sensors are automatically recognized by the DCS-2.

3.4 Rear Panel Details



3.5 Startup Instructions

Ensure the simulator is turned on and the lamp is enabled. Check the shutter control on the XPS power supply is closed.
Ensure that the Shutter Control cable is connected to the DCS-2 and the XPS power supply.
Connect one or both sensors to the DCS-2.

Connect the **MAINS** power. Before turning on the **MAINS** power on make sure of the following:

- The Shutter Control cable is connected to the DCS-2.
- One or both sensors are connected to the DCS-2.

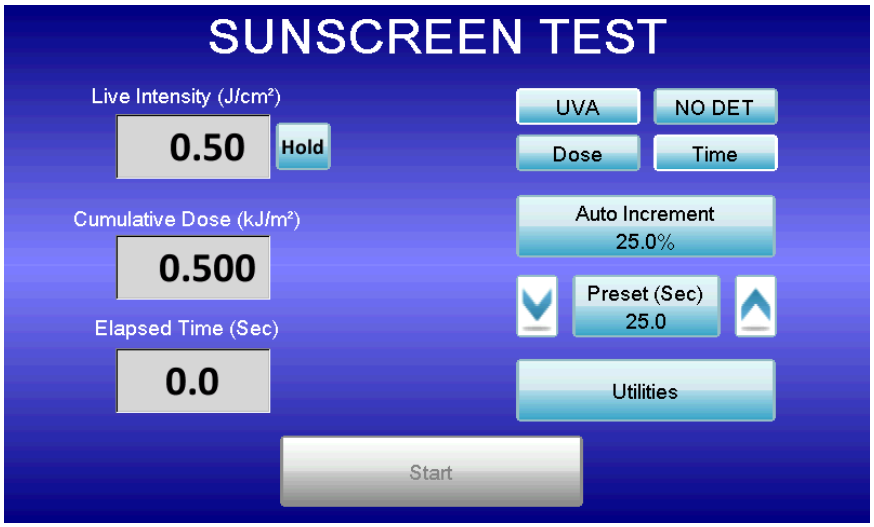
When turning the DCS-2 on for the first time, it will ask you to set the sensing %. The Factory default is 0%. Please set the sensing to 100% when new. You will only be asked to do this once for each new sensor.

3.6 Shut down Instructions

When all testing has finished, turn off Lamp Enable switch on the power supply to turn off the lamp. Wait for 10 to-20 minutes for the fan to cool the lamp, and then turn off the power supply power switch at the rear. Turn off the DCS-2 using the Power Switch on the rear panel.

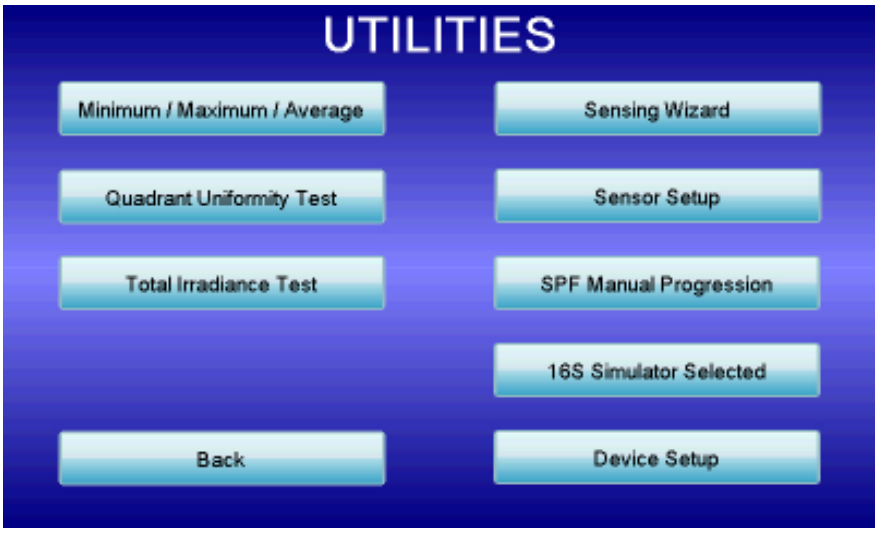
4 Test Selection and Configuration

From the Applications Screen, touch the icon that indicates SPF Testing. This will take you to the home screen of that particular application.



4.1 Utilities

Touch this button on any chosen application screen. This allows you to perform various configurations for the applications you select. Touch the Back button to exit Utilities and return to your chosen Applications screen.



4.1.1 Device Setup.

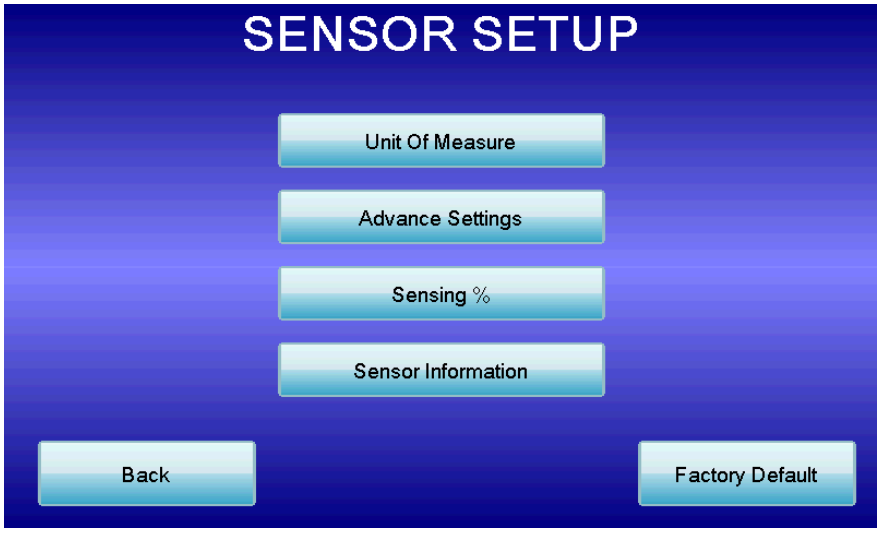
This screen allows you to set the physical parameters in terms of brightness, volume and sleep time. It also allows you to set the date and time, calibrate the touchscreen, change applications and reinstate Factory defaults. These settings will apply to all of the screens. When finished, touch the Save and then Back buttons to return to the utilities menu.

4.1.2 Simulator Selected.

Touch this button to toggle between 16S, 601 and LS1000 to select the simulator you are using.

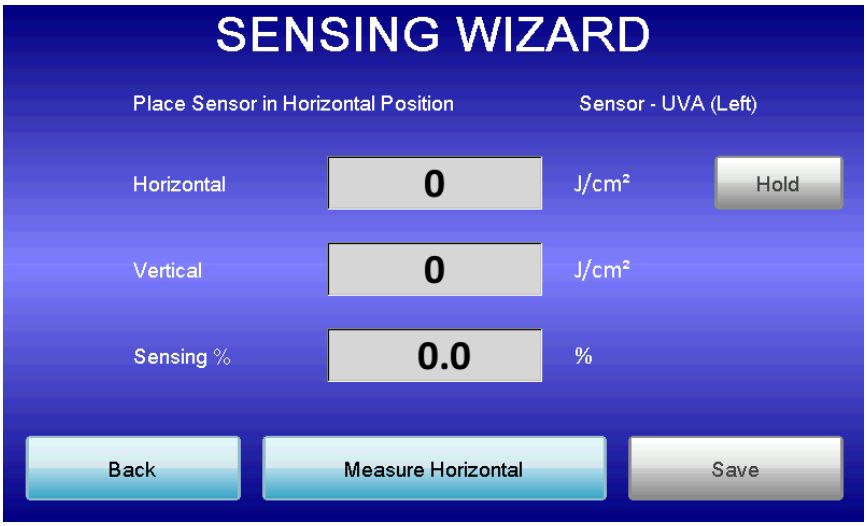
4.1.3 Sensor Setup.

This allows you to set the sensor units of measure, scale and offset settings, sensing (always 100%) and sensor data. Touch the back button to return to Utilities screen.



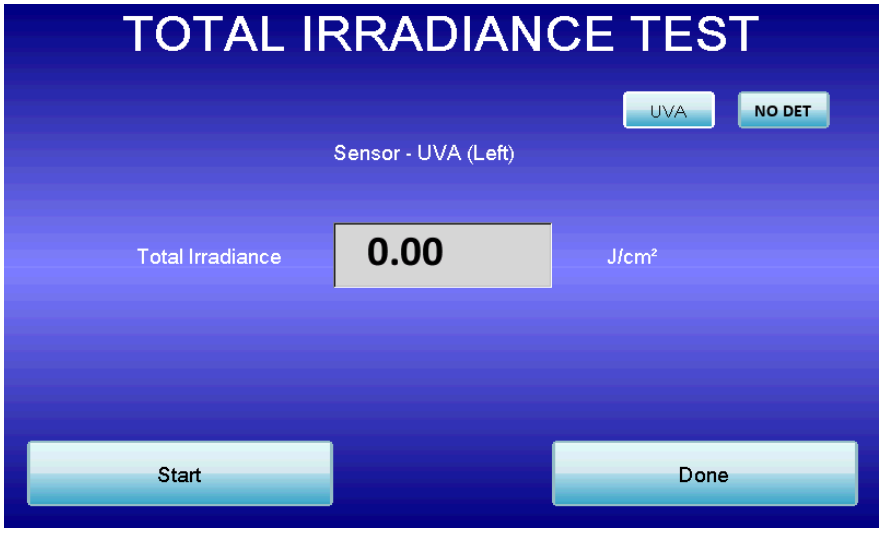
4.1.4 Sensing Wizard.

Use this screen when using a 16S Simulator with a DCS Position Stop to automatically set the dose sensing. Follow the instructions on the screen to complete the task, then touch the save and then back buttons to return to the Utilities screen.



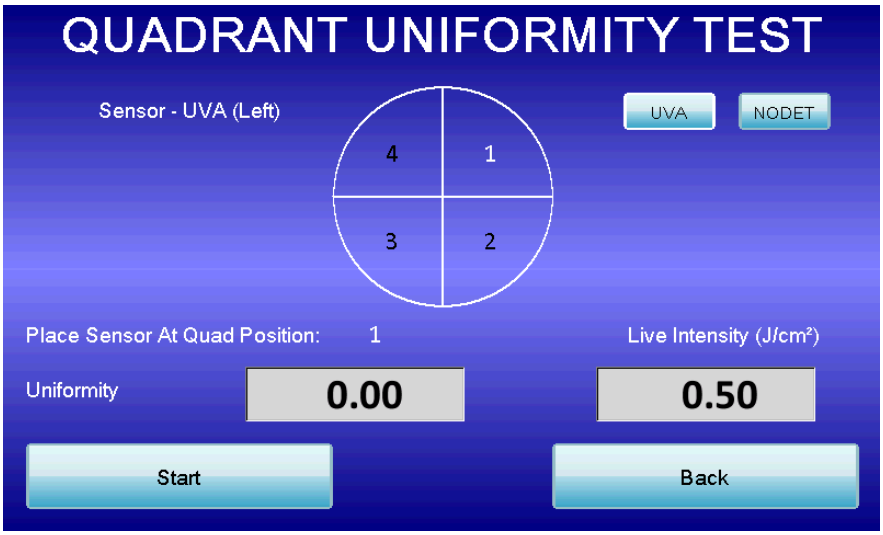
4.1.5 Total Irradiance Test.

Touch this button to measure the total irradiance of the simulator, with the PMA Total Irradiance Sensor, when using it for SPF Testing. This is a requirement of FDA and ISO to ensure the total irradiance from the simulator does not exceed 1,500/1,600mW/cm^2. Touch the Done button to return to the Utilities screen.



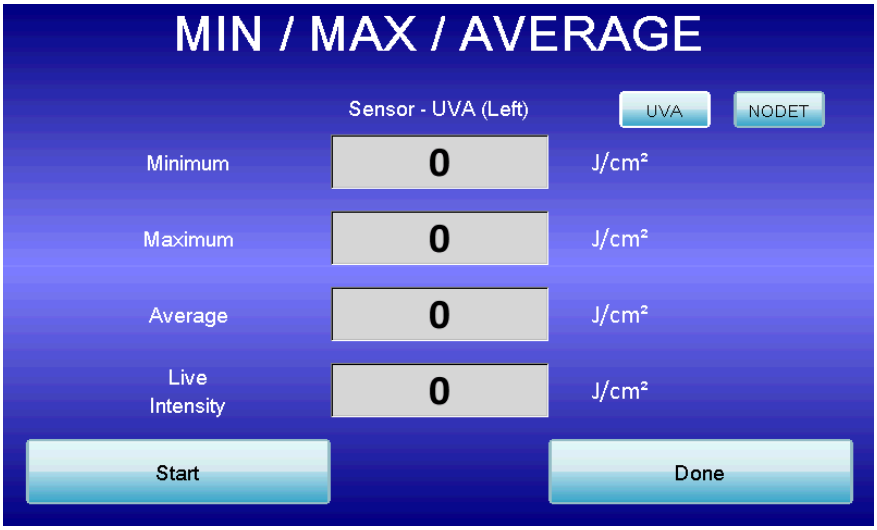
4.1.6 Uniformity Test.

Touch this button to measure the beam uniformity of the simulator, with the PMA Quadrant Sensor, when using it for SPF Testing. It is a requirement of FDA and ISO to ensure the intensity in each quadrant of the beam does not differ by more than-20%. Follow the on-screen instructions to carry out the test. Touch the Done button to return to the Utilities screen.



4.1.7 Min/Max/Average.

Touch this button to use the min/max/average feature when measuring beam intensities prior to testing. Touch the Done button to return to the Utilities screen.



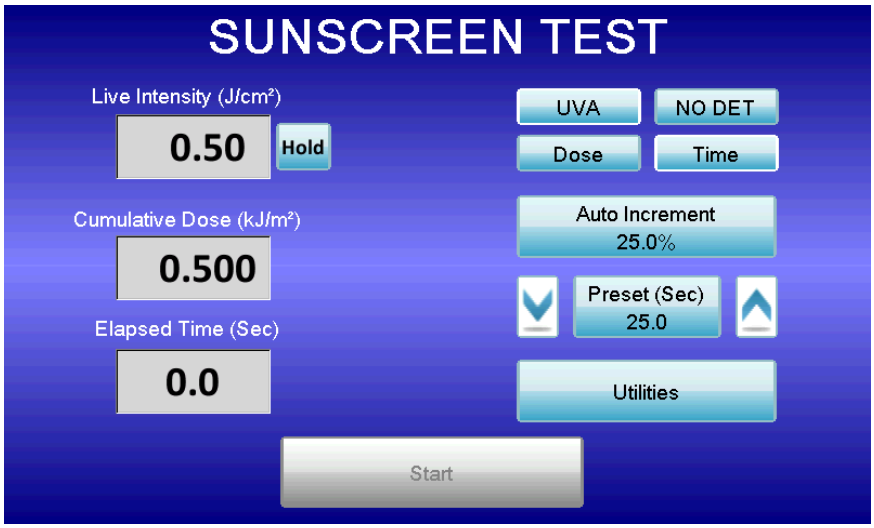
4.1.8 Manual Progression.

Touch this button to toggle between Manual Progression and Auto Progression. If Auto Progression is selected, see section 4.2.2 for the set up procedure.

4.2 Sunscreen Test. Model 16S set up and run

With Model 16S selected, from the Applications screen, touch the SPF Test icon to enter the SPF Test screen. To exit the SPF Test screen, touch the Utilities, Device Setup and Change Application buttons to return to the Applications Screen.

If Manual Progression is selected in the Utilities Menu, this screen will appear:



4.2.1 Dose and Time.

Touch Dose or Time buttons to select which you would like to use to run your test. If Dose is chosen, the Preset button will indicate the measurement parameter in Joules/cm2 for UVA testing or MED for Erythema testing. The median dose would be that expected to produce MPPDDu or MED for the particular subject. If Time is selected, the parameter is Seconds. The median time would be that expected to produce MPPDDu or MED. (See Preset below).

4.2.2 Auto Increment.

Touch this button to set the Sunscreen auto increment sequence for your test. A list of preset sequences is available on the left side of the screen, or you can customize your own sequence using the keypad. Once complete, touch the Enter and then the back buttons to return to the SPF Test screen.

4.2.3 Preset.

Use this button to set a preset dose or time for the Sunscreen test. Touch the Enter and Back buttons to return to the Sunscreen Test screen. Use the ^ and v buttons either side of the Preset button to increase or decrease the preset by the auto increment value set in 4.2.2.

4.2.4 Start.

Use this button to start the test. During the test you can touch the button again to pause the test if necessary. A further touch resumes the test, or if you need to abandon the test, touch the button for 5 seconds, until the button background turns red, to reset the screen ready to start the next test.

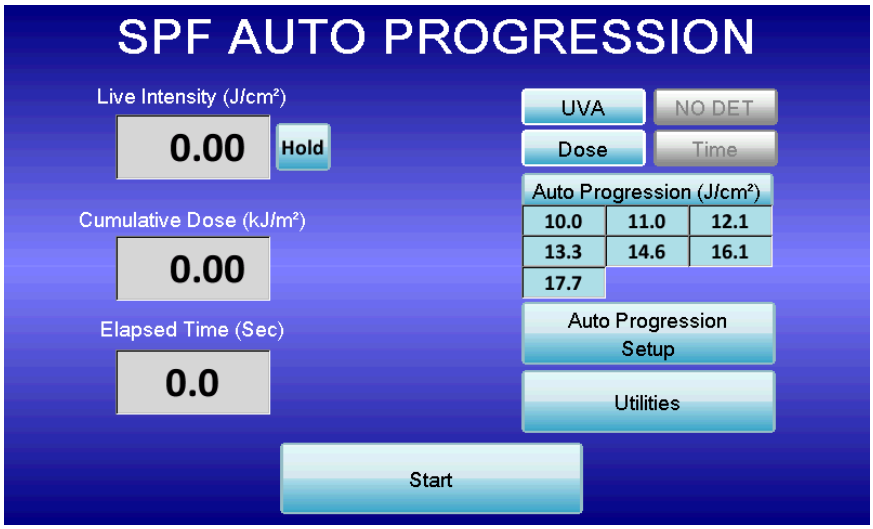
To set up a sequence when using the 16S Simulator, place the Erythema or UVA sensor in the beam and measure the intensity. Select “Time” on the screen.

1. A Typical example of a timed sequence would be:
Measure the intensity of the 16S.
Calculate the time to achieve the expected MPPDDu or MED.
Enter this value in the Preset (Sec) screen
Enter the sequence value in the Auto Increment screen
Begin the exposure. The first test can be the shortest, longest or median exposure. If the shortest is chosen, press the start button and the shutter will open. After the preset time, the shutter will close and the exposure is complete.
Press the reset button, press the ^ or v keys to move onto the next increment in the sequence.
Continue until all increments have been done.

2. For a Dose controlled exposure:
Measure the intensity of the 16S and press the Hold key at the side of the Live Intensity indicator.
Select the desired preset dose and enter it into the Preset (J/cm2 or MED) indicator.
Press Start to open the shutter. When the dose is achieved, the shutter will close.
Press the reset key and the ^ or v keys to move on to the next increment.
Continue until all increments have been done.

3. 16S with DCS Position Stop:
Ensure the sensor has been set up using the Sensing Wizard in 4.1.4 above.
Put the sensor in the Vertical position
Select the desired preset dose and enter it into the Preset (J/cm2 or MED) indicator
Press Start to open the shutter. When the dose is achieved, the shutter will close.
Press the reset key and the ^ or v keys to move on to the next increment.
Continue until all increments have been done.

If Auto Progression is selected in the Utilities Menu, this screen will appear:



4.2.5 Auto Progression Setup.

Touch this button to set the progression parameters for your test. The following screen appears.

4.2.6 Dose and Time.

Touch Dose or Time buttons to select which you would like to use to run your test. If Dose is chosen, the Preset button will indicate the measurement parameter in Joules/cm2 for UVA testing or MED for Erythema testing. The Preset dose would be that expected to produce MPPDDu or MED for the particular subject. If Time is selected, the parameter is Seconds. The Preset time would be that expected to produce MPPDDu or MED.

4.2.7 Preset.

Use this button to set a preset dose or time for the Sunscreen test.

4.2.8 Auto Increment.

Touch this button to set the Sunscreen auto increment sequence for your test. A list of preset sequences is available on the left side of the screen, or you can customize your own sequence using the keypad. Once complete, touch the Enter button to return to the Auto Progression Setup screen.

Touch the number box to select the number of exposures you would like in the series; 5, 6 or 7.
Touch the number box to select in which position you would like your Preset value.
Touch the Exposure Order box to select the order you would like the exposure to run; High to Low or Low to High.
The progression values will show in the Progression boxes.
Touch the Calculate and then Enter buttons to return to the SPF Auto Progression screen.

4.2.9 Start.

Use this button to start the test. During the test you can touch the button again to pause the test if necessary. A further touch resumes the test, or if you need to abandon the test, touch the button for 5 seconds, until the button background turns red, to reset the screen ready to start the next test.

1. A Typical example of a timed progression would be:
Measure the intensity of the 16S.
Calculate the time to achieve the expected MPPDDu or MED.
This is the value you enter in the Preset (Sec) screen during Setup.
Begin the exposure by pressing the start button and the shutter will open. After the preset time, the shutter will close and the exposure is complete.
Press the start button again and the shutter will open to begin the-2nd exposure in the sequence. Continue until all the exposures in the sequence have been completed.

2. A typical example of a Dose controlled progression would be:
Measure the intensity of the 16S and press the Hold key at the side of the Live Intensity indicator.
Select the desired preset dose and enter it into the Preset (J/cm2 or MED) indicator.
Press Start to open the shutter. When the dose is achieved, the shutter will close.
Press the reset key and the ^ or v keys to move on to the next increment.
Continue until all increments have been done.

3. 16S with DCS Position Stop:
Ensure the sensor has been set up using the Sensing Wizard in 4.1.4 above.
Put the sensor in the Vertical position
Select the desired preset dose and enter it into the Preset (J/cm2 or MED) indicator.
Press the Start to open the shutter. When the dose is achieved, the shutter will close.
Press the Start button again, and the shutter will open to begin the-2nd exposure in the sequence. Continue until all the exposures in the sequence have been completed

5 Specifications

Mains voltage	100VAC to-240VAC
Current	0.8A
Line frequency	50/60 Hz
Output	24VDC
Current	1.25A
Operating temp range	0 to 50 deg. C. No precipitation
Display	7” Touch Screen
Sensor Inputs	2
Weight	2.1 lbs (930 g)
Size	9.5” (241mm) x 3.5” (89mm) x 8.5” (216mm)