DIGITAL RADIOMETER

MODEL **PR203**

USER GUIDE

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IRRADIAN
Light Measurement Systems & Calibration

DIGITAL RADIOMETER

MODEL **PR203**

USER GUIDE

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1 INTRODUCTION

The Irradian portable phototherapy radiometer (model PR203) is designed specifically to measure the spectral irradiance of blue light sources which are used for the treatment of hyperbilirubinaemia in new born babies.

The radiometer comprises of a hand held, battery operated display unit, a small detector and a connecting cable.

The detector is carefully constructed to give an optical response that closely matches the absorption curve of bilirubin; that prevents the measurement of non-therapeutic light and that allows accurate measurements of three different types of light sources, where ever they are placed with respect to the radiometer. The sensor used in the detector is a silicon photodiode which performs with excellent linearity and long term stability.

Note the PR203 radiometer is not an ultra violet radiometer and should not be used to measure the output of ultra violet lamps such as those often used in ultra violet phototherapy treatment.

2 FRONT PANEL CONTROLS

PR203 DISPLAY UNIT

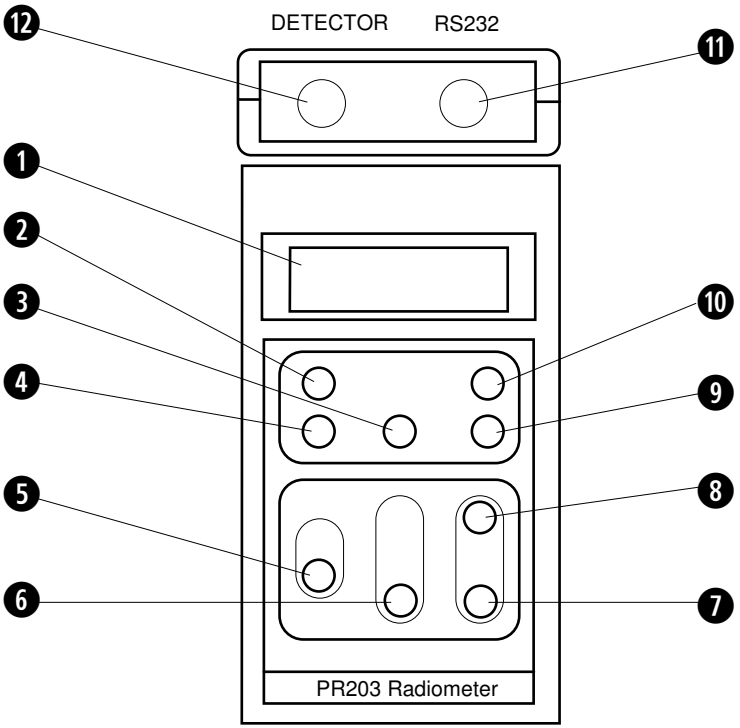


Figure 1

1. 4½ digit LCD display
2. Display backlight button
3. Background *ZERO* button
4. *RESET* button
5. Auto/manual *RANGE* button
6. *SOURCE* select button
7. *MODE* select button
8. *FUNCTION RESET* button
9. *HOLD/RUN* function button
10. Power switch button
11. Computer connection
12. Detector connection

The battery compartment cover is at the rear of the display unit.

2 FRONT PANEL CONTROLS **(continued):**

BUTTON AND CONNECTOR DESCRIPTIONS

❷ ⊛	Turns the display backlight on and off. The display backlight will turn off automatically after 60 seconds.
❸ *ZERO*	Starts a zero or background measurement.
❹ *RESET*	Press to return to the normal measurement mode from either the manual range or special function modes. Note the display hold is not reset.
❺ *RANGE*	Selects either auto ranging or manual range control. In manual range control, repeated button pressing steps through the gain ranges.
❻ *SOURCE*	Select between the three measurements of irradiance from different light sources; Halogen, Fluorescent or LED (Light Emitting Diode) in spectral irradiance units ($\mu W/cm^2/nm$).
❼ *MODE*	Select between the *Average*, *Min*, *Max* and *Integrate* special function modes.
❽ *FUNCTION RESET*	Press to reset the function mode values to zero.
❾ *HOLD/RUN*	Press to hold the current reading. Press again to release the held readings. Press to run or hold a special function mode.
❿ ⏻	Turns the power on and off.
⓫ Connector	Computer interface connection (5 pin RS232). (optional radiometer-computer interface cable).
⓬ Connector	Detector connection (8 pin).

3 OPERATION

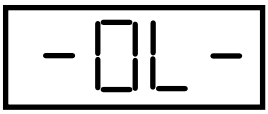
SWITCHING ON

1) With the unit initially OFF, plug the detector 8 pin connector into the detector socket ⓬ on the top of the display unit.

2) Clean the white diffuser on the top of the detector if it looks marked or dirty (see Section 5, CARE AND MAINTENANCE).

3) Press and release the power button ⓾ on the PR203 display key pad.

The radiometer will start, with the display briefly showing:-



The radiometer will now automatically search for the correct range to use with the current light levels.

A typical display is shown:-

On the front panel, one LED will indicate the measurement units and another, which light source is currently selected (Halogen, Fluorescent or LED). This will be the same as that last selected when the radiometer was switched off.

4) Press and release the *SOURCE* button ❻ to select the correct source required. For incandescent sources the correct setting is 'Halogen'. For irradiance measurements with a fluorescent tube, the correct setting is 'Fluorescnt.' and with a blue dominant wavelength LED the correct setting is 'LED'.

3 OPERATION **(continued):**

5) The radiometer should be zeroed regularly to remove the unwanted background level. First, place the supplied blanking cap over the detector diffuser. Then press and release the *ZERO* button ❸.

   Whilst the zero is being taken, the display will show:-

6) The radiometer measures the background level on each of the gain ranges and stores these values in memory. All further measurements will subtract these values before displaying the correct measurement.

   At the end of the zero sequence the display will show:-

7) Remove the blanking cap from the front of the detector. The radiometer is now ready for use.

4 SPECIAL FUNCTION MODES

AVERAGE MODE

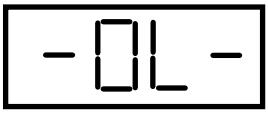
When the light source is unstable, press and release the *MODE* button ❼ to switch to average mode. The radiometer will switch to manual ranging with the *Manual* LED on. The *Average* LED will also switch on, the *SOURCE* LED will remain unchanged.

To begin to average the readings, press and release the *HOLD/RUN* button ❾. Initially the display will show a fluctuating signal, reflecting the light source fluctuations. After a short time the amplitude of the fluctuations will decrease and the display will begin to show a reading which represents the average light level during the period of the measurement.

At any time the averaging process can be stopped by pressing the *HOLD/RUN* button ❾. The display will flash 'HOLd' intermittently.

At any time the averaging sequence can be reset by pressing and releasing the *FUNCTION RESET* button ❽.

If the light level fluctuations are large and any one reading causes the detector amplifier to overload at this range the averaging process will be terminated and the display will show:-



To avoid an overload condition, *RESET* the radiometer (button ❹) and manually change the *RANGE* (button ❺) to a lower lever. e.g. from a 34.00 range to the 34.0 less sensitive range.

4 SPECIAL FUNCTION MODES (continued):

MAXIMUM AND MINIMUM LEVELS

During an average measurement sequence the maximum and minimum values attained in the period are recorded. Press the *HOLD/RUN* button ❾ to stop the averaging sequence. Press the *MODE* button ❼ to select between *Average, Min, Max* and *Integrate*. Note the integrate display may overload and show - 0 L -.

It is also possible to view a *Min* or *Max* recording sequence by selecting *Min or Max* before selecting *RUN*.

Press *FUNCTION RESET* ❽ to set the *Max*, *Average* and *Integrate* values to zero and the *Min* to - 0 L -. Note the *FUNCTION RESET* button still operates whilst in a measurement sequence or in the *HOLD* mode.

INTEGRATE MODE

For measurements of the integrated dosage or exposure, press the *MODE* button ❼ to select *Integrate*. Press the *HOLD/RUN* button ❾ to start the measurement.

Note because the meter is set into a manual gain range for this measurement, the detector amplifier will not autorange, so as with *Average* measurements, if the amplifier overloads at any time the display will show - 0 L - and the measurement will halt.

The units for the integrated measurements are μJ/cm²/nm.

At the end of the integration period *HOLD* the display (button ❾). Use the *MODE* button ❼ to also display the *Min*, *Max* and *Average* values.

Press *FUNCTION RESET* (button ❽) to return the *Integrate*, *Max* and *Average* values to zero and the *Min* to - 0 L -. Note the *FUNCTION RESET* (button ❽) will also operate during a measurement sequence or in the *HOLD* mode.

5 CARE AND MAINTENANCE

CLEANING AND GENERAL HANDLING

1) The PR203 radiometer can be cleaned using a moist cloth with detergent. Do not use solvent or alcohol to clean surfaces.

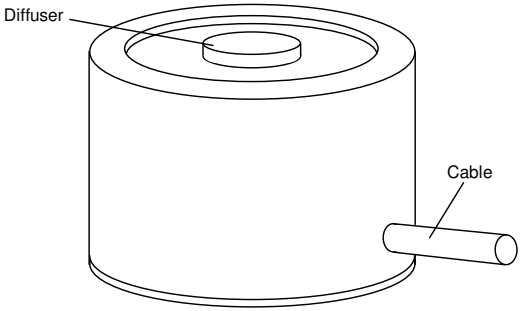


Figure 2

2) The white diffuser on the top of the detector should be kept clean at all times. Only use solvent or alcohol to clean this surface.

3) The radiometer is a precision instrument, protect from shocks, extremes of temperature and humidity etc.

4) Avoid supporting the detector by the connecting cable.

5) The display unit and detector are not waterproof. Do not immerse either in water.

6 BATTERY REPLACEMENT

REMOVAL AND REPLACEMENT PROCEDURE

1) Switch off the radiometer ⑩ before changing or checking the battery.

2) Slide open the battery compartment cover located on the back of the radiometer (Figure 3) and carefully lift out the battery.

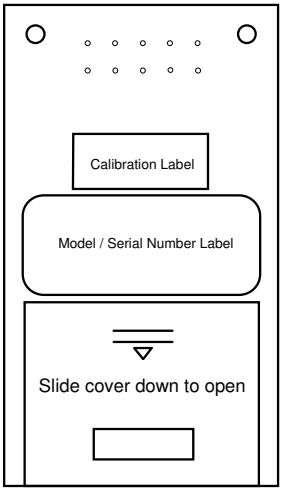


Figure 3

3) Measure the voltage across the battery clip terminals. If it is less than 7.0 volts the battery must be changed.

4) If the battery needs replacing, disconnect the battery carefully from the battery clip.

5) Replace with a new, size PP3, 9 volt battery.

6) Re-connect the new battery to the battery clip. Replace the battery inside the battery compartment with the battery clip to the left of the battery, wires pointing up and slide the cover closed.

7) Note it will be necessary to switch the radiometer on and off once before normal operation will commence again.

7 ENVIRONMENTAL CARE, RECYCLING AND DISPOSAL

The purpose of the European Commission WEEE directive (Waste Electrical and Electronic Equipment; 2002/96/EC) is to ensure that electrical and electronic products are recycled using the best treatments, recovery and recycling techniques that are currently available. This is so that high health standards and a lasting environmental protection can be achieved and maintained.

This product has been designed and manufactured using high quality materials and components, many of which can be recycled and reused.

Please remember to observe the local regulations that govern both the disposal of the packaging materials accompanying this product and any used batteries.

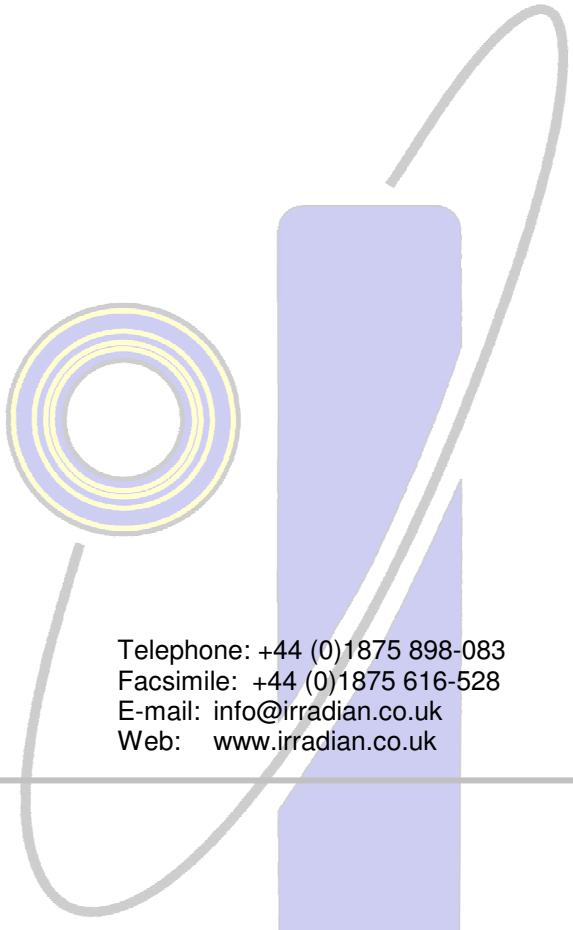
DO NOT DISPOSE OF THIS PRODUCT IN YOUR GENERAL WASTE BIN.

Please inform yourself about your local WEEE collection system which is available for electrical and electronic products that are marked with the symbol shown here.

When disposing of this meter, please use one of the following options:

1) Use your local designated WEEE collection facilities to dispose of the complete product (including cables, detectors, filters & accessories).

2) Return the complete product back to Irradian, marking it clearly as intended for WEEE disposal.



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