

Instruction Manual OLYMPIC BILI-METER™

Model 22



Read and be familiar with this manual before operating or servicing this device. To ensure operator, technician, and patient safety, use only as specified in this manual.

Contents

Overview	1
Conventions	1
Symbols	1
Intended Use	2
Description	2
Measuring Irradiance	3
Units of Measurement	3
Instrument Response Characteristics	3
Operation	4
Connecting the Sensor	4
Taking Measurements	5
Cleaning	7
Maintenance and Service	7
Replacing the Battery	7
Calibrating the Bili-Meter	8
Service and Repair	8
Returning for Calibration or Service	8
Contacting Olympic Medical	8
Specifications	9

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Overview

This manual provides the necessary information to maintain and service the Olympic Bili-Meter™. The operating instructions in this manual are intended for use under the direct supervision of a licensed medical practitioner. The service instructions in this manual are intended for use by qualified technicians.

Conventions

The following conventions are used in this manual.





Table 1 Conventions




Convention	Description
 NOTE	Notes provide additional information to clarify a point in the text.
 CAUTION	Cautions indicate situations that, if not avoided, could result in minor to moderate injury to the patient or operator, or damage to the equipment.
 WARNING	Warnings indicate situations that, if not avoided, could result in serious injury or death to the patient or operator.
BUTTON	This character style represents buttons and controls that the user can touch or press.

Symbols

The following symbols are located on the Olympic Bili-Meter and its packaging.

Table 2 Symbols

Symbol	Definition
	Atmospheric pressure
	Battery
	Caution, read instructions
	Humidity, condensing

Symbol	Definition
	Shipping
	Storage
	Temperature

Intended Use

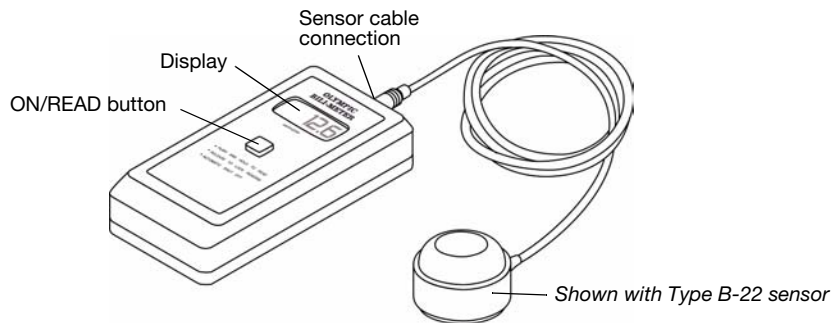
The Olympic Bili-Meter™ Model 22 is a spectroradiometer for measuring the irradiance (radiant power) of neonatal phototherapy lights and pads.

Description

The Olympic Bili-Meter is comprised of a readout and a detachable sensor (either the Type B-22 or the Type F-22, see below).

Readout

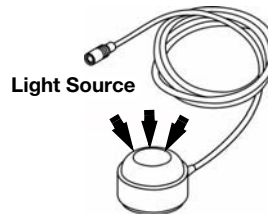
Figure 1 Olympic Bili-Meter Model 22 readout



Type B-22 Sensor

This sensor is used to measure the irradiance of phototherapy lights placed over the patient (e.g., Olympic Bili-Lite Model 33).

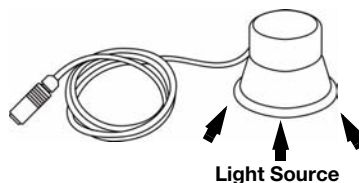
Figure 2 Type B-22 sensor



Type F-22 Sensor

This sensor is used to measure the irradiance of phototherapy light pads or mattresses placed beneath the patient (e.g., Olympic Bili-Pad or the Olympic Bili-Bassinet).

Figure 3 Type F-22 sensor



Measuring Irradiance

The Bili-Meter is a spectroradiometer that measures the therapeutic irradiance (radiant power) of neonatal phototherapy lights. It measures the irradiance of the wavelengths from 425 to 475 nanometers (nm), the blue-green portion of the spectrum, which includes the principal action spectrum of bilirubin.

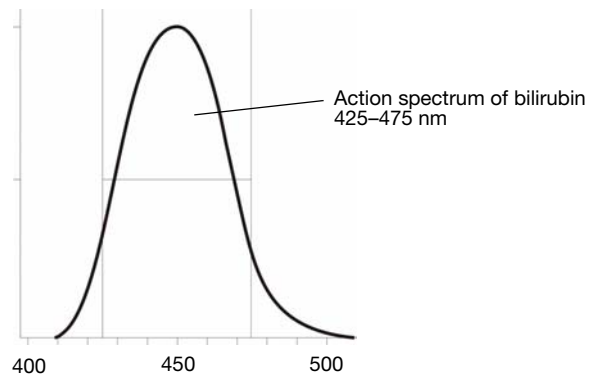
Units of Measurement

The Bili-Meter measures irradiance in units of microwatts per square centimeter per nanometer ($\mu\text{W}/\text{cm}^2/\text{nm}$). A nanometer is a measure of wavelength equal to one-billionth of a centimeter. The term “per nanometer” indicates the average irradiance per nanometer across the spectral band being measured, which is 50 nm wide. This makes it possible to compare average irradiance across spectral bands of different widths.

Instrument Response Characteristics

Figure 4 represents the nominal response characteristics of the Bili-Meter, which matches the action spectrum of bilirubin as closely as possible.

Figure 4 Nominal response of the Bili-Meter



Operation



Explosion hazard. Do not use this device in the presence of flammables (e.g., oxygen, nitrous oxide, anesthetics).



- Read and be familiar with this instruction manual before using this device.
- Only use this device under the direct supervision of a licensed medical practitioner.
- Inspect this device before each use to ensure proper functioning.

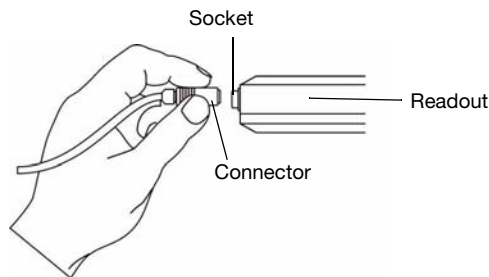


The hospital/facility is responsible for ensuring that all personnel who operate or maintain this device are trained in its operation and safe use, and for maintaining training records of attendance and evidence of understanding.

Connecting the Sensor

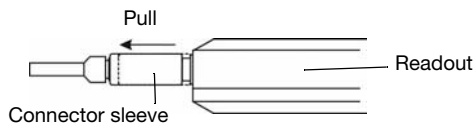
The sensor connects to the socket on the readout. To connect, turn the connector until the keyed slots are aligned, then carefully insert the connector into the socket.

Figure 5 Connecting the sensor to the readout



Never pull on the cable to remove the connector.

Figure 6 Disconnecting the sensor

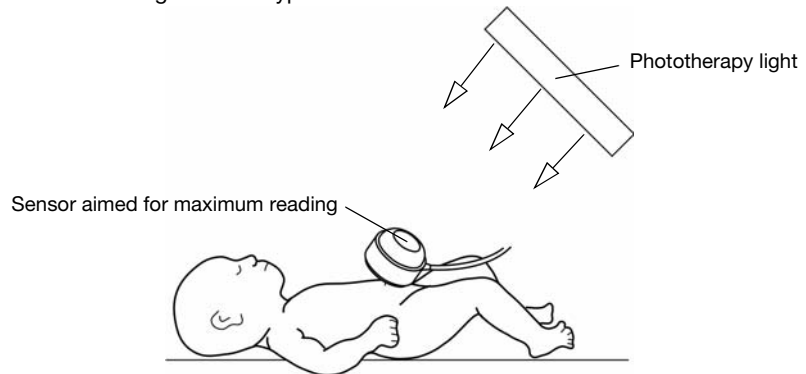


Taking Measurements

To use the Type B-22 sensor:

- 1 Connect the sensor to the readout.
- 2 Hold the sensor against the infant's body as near to the umbilical as possible and aim the sensor at the center of the phototherapy light (see Figure 7).
 - For reproducible measurements, always hold the sensor on the same place on the infant's body.
 - Changes in the distance or angle of the light to the patient will change the irradiance the patient receives, requiring new measurements to be taken.

Figure 7 Measuring with the Type B-22 sensor

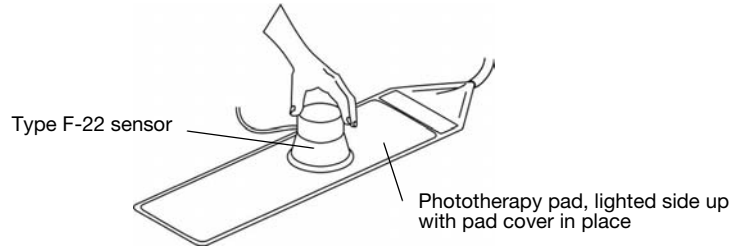


- 3 Press and hold **READ**. "On" briefly displays, then the irradiance measurement displays. While pressing **READ**, adjust the aim of the sensor to obtain the maximum reading.
- 4 Release **READ**. The irradiance measurement locks on the display for 30 seconds then automatically shuts off to preserve battery life.
 - When charting irradiance, note the type of radiometer used (e.g., Olympic Bili-Meter) and sensor (e.g., Type B-22).
 - If more than one phototherapy light is being used on the infant, take separate measurements for each light and chart each reading.

To use the Type F-22 sensor:

- 1 Connect the sensor to the readout.
- 2 Place the sensor, with white diffuser down, in the middle of the lighted side of the pad or mattress (see Figure 8). Any disposable covers should be on the pad or mattress.

Figure 8 Measuring with the Type F-22 sensor



Always make sure that the entire white diffuser of the sensor is over the lighted area of the pad, otherwise inaccurate measurements may result.

- 3 Press and hold **READ**. “On” briefly displays, then the irradiance measurement displays.
- 4 Release **READ**. The irradiance measurement locks on the display for 30 seconds then automatically shuts off to preserve battery life.
- 5 Take two additional readings at different places on the pad, then average all three readings. If a pad is being used at the same time as an overhead phototherapy light, measure and chart the irradiance of the pad and the light separately with the appropriate type of sensor.

Messages

The following messages may show on the display of the readout.

Table 8.1 Messages

Display	Message	Description
□+	Low Bat	Battery power is low; replace the battery (see page 7).
150	Over Range	If 150 flashes on the display when READ is pressed, the irradiance is greater than 150 $\mu\text{W}/\text{cm}^2/\text{nm}$ and is out of range of the Bili-Meter.
- - -	Error	If dashes flash on the display when READ is pressed, an error condition is present: <ul style="list-style-type: none"> ■ The sensor may not be connected. Check the sensor connection and verify the sensor version. ■ The wrong version of sensor may be connected to the digital readout unit. The color of the sensor and readout calibration labels must match. ■ The sensor may have failed. Retry the read. If the problem continues, contact Olympic Medical (see page 8). ■ The digital readout may have failed. Retry the read. If the problem continues, contact Olympic Medical (see page 8).

Cleaning

Required items:

- Soft cloth
- Mild cleaning detergent (e.g., Virex™ Tb, Virustat®, Coverage®) or mild soap-and-water solution

To clean the Bili-Meter:

- 1 Confirm that the Bili-Meter is off. If it is on, press **POWER** to turn it off.
- 2 Dampen the cloth with either the mild soap-and-water solution or detergent, then wipe down all exterior surfaces of the Bili-Meter.

Maintenance and Service



CAUTION

- Only qualified technicians should maintain or service this device.
- Read and be familiar with this instruction manual before maintaining or servicing this device.
- The printed circuit boards (PCBs) contain static sensitive parts. Always use appropriate electrostatic discharge protection, such as an electrical-grounding wrist strap, when working with internal components.
- To assure accuracy, factory-calibrate the Bili-Meter to a radiometric standard annually (see page 8).

Replacing the Battery

Required items:

- 5/64-in. FLS Allen wrench
- 9-volt alkaline, non-rechargeable battery

To replace the battery:

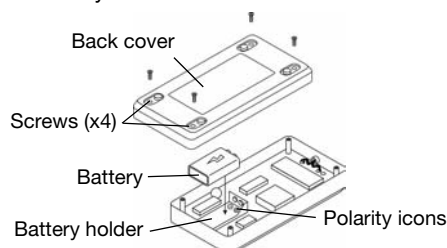
- 1 Remove the back cover: Loosen and remove the four screws that secure the back cover of the readout (see Figure 9).



NOTE

An instruction label on the inside of the back cover illustrates how to remove and insert the battery.

Figure 9 Replacing the battery



- 2 Insert the new 9-volt battery into the battery holder (see Figure 9).

Calibrating the Bili-Meter

The Bili-Meter was factory calibrated to a radiometric standard traceable to the National Institute of Standards and Technology (NIST). The calibration certificate is enclosed with this manual.

To assure continued accurate measurement of irradiance, the Bili-Meter should be recalibrated every 12 months to a radiometric (irradiance) standard. Because certain calibration factors are stored in the Bili-Meter memory, the Bili-Meter must be recalibrated at Olympic Medical. The date of the last calibration is labeled on the readout and sensor.

Both the readout and sensor should be returned for calibration. Bili-Meters under warranty are recalibrated at no cost. Others are recalibrated at nominal cost. For information on returning the Bili-Meter, see below.

Service and Repair

The Olympic Bili-Meter has no customer serviceable parts, and must be returned to Olympic Medical for all repairs and parts replacement. After any service, the Bili-Meter must be recalibrated radiometrically to assure accurate measurement of irradiance.



Customer attempts to service the Bili-Meter will invalidate the warranty and may result in irreparable damage.

Returning for Calibration or Service

The readout and sensor must be returned together for calibration or service.

When sending equipment to Olympic Medical for service:

- Clean the device, then securely package it, and include:
 - a A letter stating whether calibration and/or service is desired. If service, describe the problem.
 - b Purchase order (PO) number to assure faster turn-around time.
 - c Return address and bill-to information.
 - d Contact person (name and telephone number).

Contacting Olympic Medical

To order additional sensors, contact:

Olympic Medical
Customer Service Department
5900 First Ave S
Seattle, WA 98108 USA

Toll-free: 1-800-426-0353 (US/Canada)
Phone: 206-767-3500 (worldwide)
Fax: 206-762-4200
Web: www.OlympicMedical.com

Specifications

Intended Use

The Olympic Bili-Meter™ Model 22 is a spectroradiometer intended to measure the irradiance of neonatal phototherapy lights.

Irradiance

Irradiance is measured from 425–475 nm. The display shows values from 0.0 to 150.0 $\mu\text{W}/\text{cm}^2/\text{nm}$.

Dimensions

Digital Readout Unit

7.25-in. long x 3.4-in. wide x 1.75-in. deep
18.4-cm high x 8.6-cm wide x 4.4-cm deep

Type B22 Sensor

1.5-in. high x 2.5-in. diameter; 46-in. cable
3.8-cm high x 6.4-cm diameter; 116.8-cm cable

Type F22 Sensor

2.3-in. high x 3.2-in. diameter; 47-in. cable
5.8-cm high x 8.1-cm diameter; 119.3-cm cable

Weight

- Digital Readout Unit: 13 oz 369 g
- Type B22 sensor: 5.25 oz 149 g
- Type F22 sensor: 3.75 oz 106 g

Electrical

9V alkaline battery, non-rechargeable

Environmental

Temperature

- Operating: 50–104°F 10–40°C
- Shipping: -40–158°F -40–70°C
- Storage: -4–113°F -20–45°C

Relative Humidity (RH)

- Operating: 10–95%, non-condensing
- Shipping/Storage: 10–100%, condensing

Operating Altitude

Up to 10,000 ft Up to 3,000 m

Operating/Shipping Pressure

0.5–1.0 atm 500–1060 hPA

Controls

ON/READ button turns on digital readout unit; the irradiance reading locks on the display when the button is released. The device automatically shuts off after 30 seconds.

Display

Liquid-crystal display (LCD)

Product and Accessories

Item	Catalog No.
Bili-Meter Model 22 with Type B-22 sensor	53822
Bili-Meter Model 22 with Type F-22 sensor	53825
Type B-22 sensor only	53860
Type F-22 sensor only	53865

Note: The Type B-22 and Type F-22 sensors can be used interchangeably with the Bili-Meter digital readout unit. The B-22 sensor measures the irradiance of overhead phototherapy lights, while the F-22 measures the irradiance of pads and mattresses.

Regulatory, Electrical Safety, and Classifications

- FDA Class 1
- Health Canada Class 2
- CAN/CSA 1010.1-92
- IEC 61326
- UL 61010-B-1
- Ordinary Equipment (IPXØ)
- Indoor Use Only
- Pollution Degree 2

Service

The Bili-Meter has no customer serviceable parts; return to Olympic Medical for service (see page 8).

Warranty

One-year warranty, includes parts and labor.

Electromagnetic Compatibility

The Bili-Meter meets the IEC 61326 standard. In some situations such as electromagnetic fields greater than or equal to 1 V/m or contact electrostatic discharge, abnormal operation (eg., display fluctuation) or lock-up may occur. If so, re-orient the meter and/or allow it to auto-reset and retake the reading.

Product Disposal

Disposal of the Bili-Meter does not require any special precautions. Dispose of according to your local disposal regulations.