PROBES FOR BLUE LIGHT MEASUREMENT

The GOLDILUX Bilirubin Phototherapy Meter GBIL-1L has been designed for the accurate measurement of the amount of therapeutically effective blue light used for the treatment of hyperbilirubinemia (or neo-natal jaundice). The probe detector matches the photooxidation response of Bilirubin in the blood of jaundiced neonates. This response has been shown to be most pronounced in a wavelength region from 400 to 500 nm with a maximum at 450 nm.

For effective treatment, the amount of therapeutically effective blue light to which the infant is exposed should be in the order of 5 - 10 $\mu W/cm^2$. The quantity, in units of $\mu W/cm^2$, is the therapeutically effective power from the lamp (in µW) falling on each square centimetre of skin of the infant. The length of the exposure of the infant to the blue light depends on the age and condition of the baby, its response to the exposure and other factors as determined by the responsible physician.

The factory calibration of the probe was performed at a distance of 800 mm from a spectroradiometrically calibrated phototherapy lamp and at a level of approximately 40 $\mu W/cm^2$. The lamp had a peak output at a wavelength of 450 nm.

In order to ensure continued accurate readings from the probe, it should be re-calibrated by a competent calibration laboratory at suitable intervals (yearly or as determined in accordance with the company quality system or as specified in applicable Government regulations).

Fig. 3

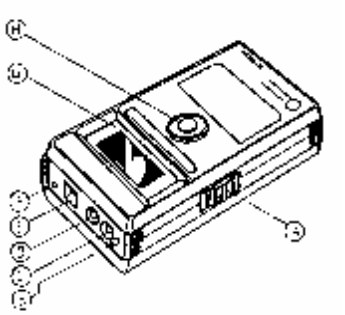
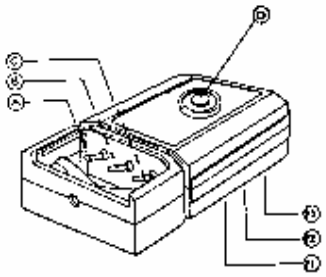


Fig. 4



WARRANTY INFORMATION

One (1) year limited warranty
The manufacturer warrants the light meters and probes against defects in materials and workmanship for a period of one (1) year from the date of original retail purchase (proof of purchase required). If an approved distributor receives notice of such defects during the warranty period, he will either, at its option, repair or replace products which prove to be defective and receive a replacement from the manufacturer.

Exclusions
The above warranty shall not apply to defects resulting from improper or inadequate maintenance by the customer, customer-supplied software or interfacing, unauthorized modifications or misuse, operation outside the environmental specifications for the product, improper site operation and maintenance, an accident or abuse.

Obtaining warranty service
To obtain warranty service, the products must be returned by the purchaser to an approved distributor. Repair or replacement of the instrument will be at the discretion of the technician at the manufacturers. They have to be notified of the warranty claim and the defective product returned to them. Replacement will be at no charge if deemed to be necessary.
Shipping charges from the customer to an approved distributor shall be to the account of the customer and shipping charges from the approved

G O L D I L U X
L I G H T
M E T E R S

USER MANUAL

GAL- 2L, GAL - 2H,
GAL- 3L with GALP probes

with special reference to: GBIL-1L

2. Switch on the instrument and check its zero with the cap firmly on the detector. Should it be necessary to adjust the meter reading to zero (e.g for calibration purposes) adjust it via the potentiometer accessible through the latch opening in the open battery compartment.
3. Remove the protective cap from the detector being used.
4. Take readings. Check on the units (Kilolux or lux or footcandles as indicated by the label).

N.B.: A 9V battery is necessary for operating the instrument and this has to be inserted in the battery compartment at the back of the meter as shown in Fig 3.

MAINTENANCE AND PRECAUTIONS

When not in use, always put the protective cap on the detector and keep the instrument in a safe place.

There is a warning "battery low" on the LCD display when the 9V battery needs to be replaced.

If necessary, clean the detector with a soft clean cloth or tissue moistened with alcohol. Dry and polish lightly with a dry tissue.

CALIBRATION

1) Meters
a) Meters with a built-in detector(e.g. GAL-2L): adjust the meter reading to zero via the potentiometer accessible through the opening in the open battery compartment. and the cap firmly on the detector,
b) Expose meter to a known illuminance, emitted by a light source of the type for which the calibration is desired. Alternatively, produce a stable illuminance with a suitable light source of the desired type and measure it with a calibrated light meter.
c) Adjust the meter with the calibration adjustment (F in Fig. 3) until it reads correctly.
d) Seal the hole (F in Fig. 3) with a suitable calibration sticker.

2) Probes
a) Plug the probe into the meter. Set the probe's range selector switch (A in Fig 4) to the lowest setting.
b) With the dustcap firmly in place (D in Fig 4) check the meter reading of zero. The potentiometer P5 indicated on the rear label of the probe

GENERAL DESCRIPTION

The GOLDILUX series of light meters are designed to measure illuminance of the visible spectral radiation in the units of lux or optionally in footcandles. An external probe may be plugged into a light meter. In this case the detector in the light meter is automatically disconnected and the displayed reading corresponds to the quantity and the units measured with the **probe**.

The liquid crystal display of the metres (GAL-2L, GAL-2H) is autoranging over one decade. External probes (e.g. GALP-1L) have a built-in **probe gain selector switch** with two different gains and thus cover a wider measuring range than the meters with built-in detector. The probe gain settings are multiplied as indicated on the probe labels and the switch setting indicated by the **probe range factor**. Probes combined with a non-specific meter (display - GAL-3L) offer the best combination with the widest possible measuring range.

EXTERNAL FEATURES AND CONTROLS

Fig. 3 indicates the layout and function of the switches and connectors and other features available on the light metres.

The ON/OFF switch (A in Fig. 3) is located on the left side of the meter housing. To switch ON move it forward. The meter is OFF when the switch is in the lower position.

The HOLD button (B in Fig. 3) can be used to "freeze" the display for convenient reading by the operator. This hold button operation can be achieved for up to 5m distance from the instrument by means of a **remote hold cable** (optional extra) plugged into connector C in Fig. 3. A simple contact closure between the two **mono plug** connector pins activates the hold ("freeze") function.

The ANALOG OUTPUT of the meter is D in Fig. 3. It can be used to supply a 2V output for a full-scale reading. It has an output impedance of 10 kS and can be used to record light levels on a chart recorder or any other suitable data acquisition system. A **stereo plug** should be used to connect the equipment to the analog output socket.

OPERATING INSTRUCTIONS

1. Remove the instrument from its case and mount or place it in the desired measurement position.

has been disabled. Return instrument for repair if zero reading cannot be obtained.

d) If required the reading is adjusted by turning the potentiometer P1 as indicated on the rear label of the probe, until the reading is correct.

e) Set the probe range factor to the higher range factor and adjust P2 (as marked on the rear label) until a reading of exactly 10 times lower is achieved than with the selector switch in the lowest range factor setting.

f) For probes with integral dose option(e.g. GALP-2L) - please refer to the manufacturer. This range has been discontinued in favour of a microprocessor range of instrumentation.

g) To make the adjustments on the potentiometers P1 and P2 it is necessary to pierce the rear label of the probe. Seal again with suitable plastic stickers after the calibration is completed.

NOTE: *Calibrations should only be performed by trained metrologists in a recognized calibration laboratory.*

SPECIFICATIONS

Measurement parameter	:	Illuminance
Dynamic range	:	1:200 000,
Readout	:	4½ digit LCD display.
Power source	:	9V type PP3 battery. Battery life approximately 200 hours for alkaline battery
Detector	:	Silicon photodiode with photo-metric filtering .
Angular response	:	As indicated in Fig. 1 (nominal values).
Spectral response	:	As indicated in Fig. 2 (nominal values).
Mass	:	Display unit : 220 g.
Accessories	:	Protective cover for detector, instruction manual.
Re-calibration	:	Return unit to a recognized calibration laboratory for re-calibration every 12-18 months (depending on frequency of usage) or if calibration is in doubt for any reason.

distributor to the manufacturer shall be paid by the approved distributor. The manufacturer shall pay for the return of the replacement product to the approved distributor, who shall be responsible for the shipping charges to the customer.

Warranty limitations

The manufacturer makes no other warranty, either expressed or implied, with respect to these products. The manufacturer specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Some states or provinces do not allow limitations on the duration of an implied warranty, therefore the above limitations or exclusion may not apply to you. However, an implied warranty of merchantability or fitness is limited to the one (1) year duration of this written warranty.
This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state, or province to province.

Exclusive remedies

The remedies provided herein are the customer's sole and exclusive remedies. In no event shall the manufacturer be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract, tort, or any other legal theory. Some states or provinces do not allow the exclusion or limitations of incidental or consequential damages, thus the above limitation or exclusion may not apply to you.

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INDIGENOUS SYSTEMS
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Tel: (011) 315-6444 Fax: (011) 315-6432
Attn: Charles Philips, Fanie
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CIE* parameters :**

V(8) match	$[f_1']$	<3%
UV response	[u]	<0.1%
IR response	[r]	<0.1%
Cosine response	$[f_2]$	<1.5%
Linearity error	$[f_3]$	<0.1%
Error of display unit	$[f_4]$	<0.1%
Temperature coefficient	$[''(T_2=5^{O}C)]$	<-0.2%/^{O}C
Fatigue	$[f_5]$	<0.1%
Modulated radiation	f_7	<0.1%
Polarization	f_8	<0.1%
Range change	f_{11}	<0.1%
Crest factor	C	>2
Lower frequency limit	f_l	<40 Hz
Upper frequency limit	f_u	>50 kHz

* International Commission on Illumination (CIE).

** In accordance with CIE publication 69 (1987), "Methods of characterizing illuminance and luminance meters".

Fig. 1 **Fig 2**