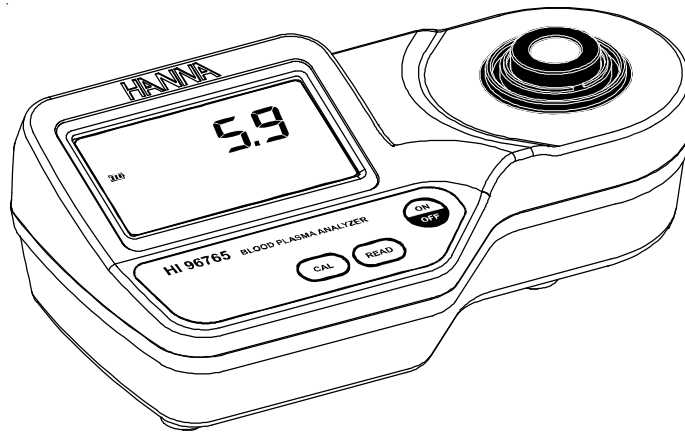


Instruction Manual

HI 96765 Blood Plasma Analyzer



Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

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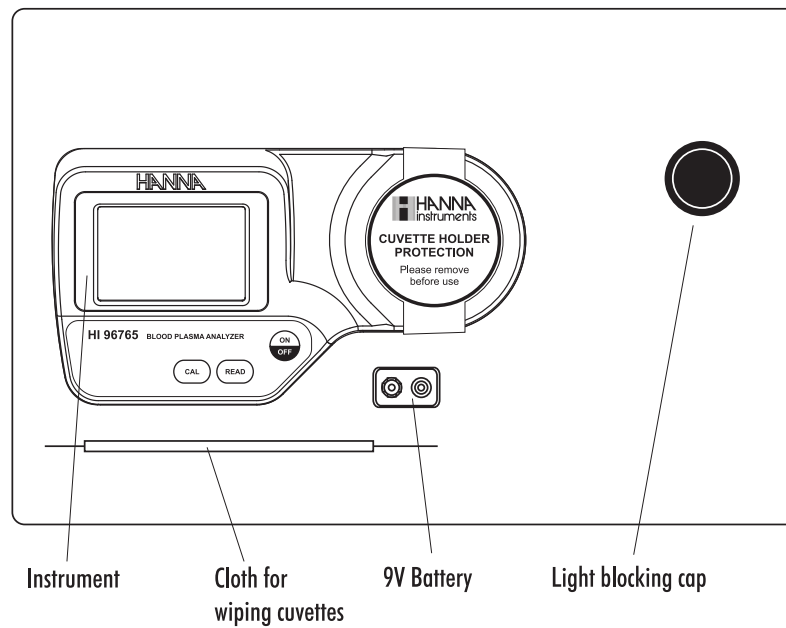
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PRELIMINARY EXAMINATION

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occurred during shipment, please notify your Dealer.

Each HI 96765 Blood Plasma Analyzer is supplied complete with:

- Light Blocking Cap
- 9V Battery
- Cloth for wiping tubes
- Instrument quality certificate
- Instruction Manual
- Rigid carrying case



Note: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

GENERAL DESCRIPTION

The **HI 96765** meter measures the light absorbance of animal blood plasma: the absorbance value allows identification of the plasma quality.

Display codes aid the user in routine operations.

The meters have an auto-shut off feature that will turn the instrument off after 10 minutes of non-use.

This instrument has been developed to measure centrifuged animal blood, coming from abattoirs.

The quality of the blood is checked by measuring its color, expressed in Quality Units. When the blood cells are damaged, haemoglobin is found in the plasma, which causes high readings. The lower are the readings in Quality Units (less color), the higher is the blood plasma quality.

This Hanna speciality meter reads directly the blood plasma quality from 0 to 10 units.

ABBREVIATIONS

°C: degree Celsius

°F: degree Fahrenheit

mL: milliliter

mV: millivolts

SPECIFICATIONS

| | |
|-----------------------|---|
| Range | 0.0 to 10.0 units |
| Resolution | 0.1 unit |
| Accuracy | ±0.2 units or 3% of reading @ 25°C (whichever is greater) |
| Typical EMC Deviation | ±0.1 |
| Light Source | Light emitting diode @ 555 nm |
| Light Detector | Silicon Photocell |
| Method | Direct Measurement |
| Environment | 0 to 50°C (32 to 122°F); max 95% RH non-condensing |
| Battery Type | 1 x 9 volt |
| Auto-Shut off | After 10' of non-use |
| Dimensions | 192 x 102 x 67 mm (7.6 x 4 x 2.6") |
| Weight | 290 g (10 oz.). |

REQUIRED REAGENTS

| <u>Description</u> | <u>Quantity/test</u> |
|--------------------|----------------------|
| Blood Animal | 1.5 mL |

PRINCIPLE OF OPERATION

Absorption of Light is a typical phenomenon of interaction between electromagnetic radiation and matter. When a light beam crosses a substance, some of the radiation may be absorbed by atoms, molecules or crystal lattices.

If pure absorption occurs, the fraction of light absorbed depends both on the optical path length through the matter and on the physical-chemical characteristics of the substance according to the Lambert-Beer Law:

$$-\log \frac{I}{I_0} = \epsilon_{\lambda} c d$$

or

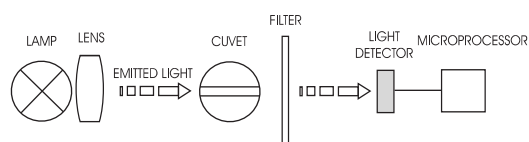
$$A = \epsilon_{\lambda} c d$$

Where:

| | | |
|-----------------------|---|--|
| $-\log \frac{I}{I_0}$ | = | Absorbance (A) |
| I_0 | = | intensity of incident light beam |
| I | = | intensity of light beam after absorption |
| ϵ_{λ} | = | molar extinction coefficient at wavelength λ |
| c | = | molar concentration of the substance |
| d | = | optical path through the substance |

Therefore, the concentration "c" can be calculated from the absorbance of the substance as the other factors are known.

Photometric chemical analysis is based on the possibility to develop an absorbing compound from a specific chemical reaction between sample and reagents. Given that the absorption of a compound strictly depends on the wavelength of the incident light beam, a narrow spectral bandwidth should be selected as well as a proper central wavelength to optimize measurements. The optical system of Hanna's **HI 96** series colorimeters is based on special subminiature tungsten lamps and narrow-band interference filters to guarantee both high performance and reliable results.



HI 96 series block diagram (optical layout)

A microprocessor controlled special tungsten lamp emits radiation which is first optically conditioned and beamed to the sample contained in the cuvette. The optical path is fixed by the diameter of the cuvette. Then the light is spectrally filtered to a narrow spectral bandwidth, to obtain a light beam of intensity I_0 or I .

The photoelectric cell collects the radiation I that is not absorbed by the sample and converts it into an electric current, producing a potential in the mV range.

The microprocessor uses this potential to convert the incoming value into the desired measuring unit and to display it on the LCD.

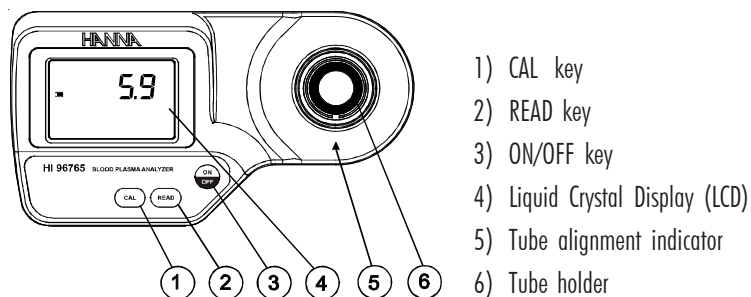
The measurement process is carried out in two phases: first the meter is zeroed and then the actual measurement is performed.

The cuvette has a very important role because it is an optical element and thus requires particular attention. It is important that both, the measurement and the calibration (zeroing) cuvettes, are optically identical to provide the same measurement conditions. Whenever possible use the same cuvette for both. It is necessary that the surface of the cuvette is clean and not scratched. This to avoid measurement interference due to unwanted reflection and absorption of light. It is recommended not to touch the cuvette walls with hands.

Furthermore, in order to maintain the same conditions during the zeroing and the measuring phases, it is necessary to close the cuvette to prevent any contamination.

FUNCTIONAL DESCRIPTION

INSTRUMENT DESCRIPTION

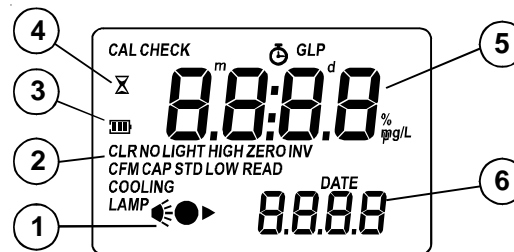


KEYPAD DESCRIPTION

- **ON/OFF:** to turn the meter on and off.
- **CAL:** to calibrate the meter prior to measurement.
- **READ:** to make a measurement.

OPERATING MODES

- *Measurement mode:* default operation mode, enables both **calibration** and **measurement**.



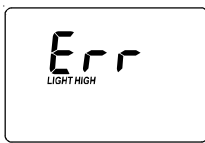
DISPLAY ELEMENTS DESCRIPTION

- 1) The measuring scheme (lamp, tube, detector), appears during different phases of calibration or reading measurement
- 2) Error messages and warning
- 3) The battery icon shows the charging level of the battery
- 4) The hourglass appears when an interval checking is in progress
- 5) Four digit main display
- 6) Four digit secondary display

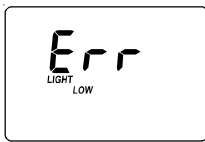
ERRORS AND WARNINGS

The instrument shows clear messages when erroneous condition appears. Messages are also displayed when the obtained values are outside expected range. The beeper is playing a beep on errors.

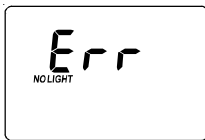
a) on calibration



Light High: There is too much light to perform a measurement.



Light Low: There is not enough light to perform a measurement.



No Light: The instrument cannot adjust the light level. Please check that the tube holder does not contain any debris.

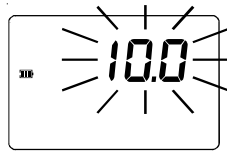
b) on sample reading



Cal: Calibration was not performed. Follow the instructions of the measurement procedure for calibrating the meter.

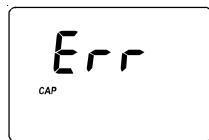


Under range: A blinking "0.0" indicates that the sample absorbs less light than the zero reference.

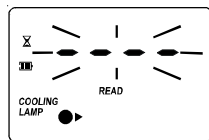


Over Range: A flashing value of the maximum concentration indicates an over range condition.

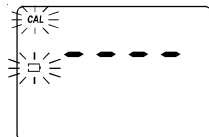
c) other errors and warnings



Cap error: An excess ambient light is reaching the detector. Please place the light blocking cap and press CAL again. If the light blocking cap is properly installed, and a calibration can not be performed, then contact your dealer or the nearest Hanna Customer Service Center.



Cooling lamp: The instrument waits for the lamp to cool down.



Battery low: The battery must be replaced soon.

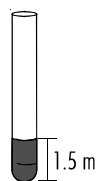


Dead battery: This indicates that the battery is dead and must be replaced. Once this indication is displayed, the meter will lock up. Change the battery and restart the meter.

GENERAL TIPS FOR AN ACCURATE MEASUREMENT

The instructions listed below should be carefully followed during testing to ensure best accuracy.

- Color or suspended matter in large amounts may cause interference, therefore these should be removed by treatment with active carbon and by prior filtration.
- For a correct filling of the tube: the liquid in the tube forms a concavity on the top; the bottom of this concavity must be at the same level of the 1.5 mL mark.
- It is important that the sample does not contain any debris. This would corrupt the reading.
- Whenever the tube is placed into the measurement cell, it must be dry outside, and completely free of fingerprints, oil or dirt. Wipe it thoroughly with **HI 731318** or a lint-free cloth prior to insertion.
- It is possible to take multiple readings in a row, but it is recommended to make a new calibration for each sample.



STARTUP

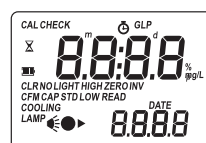
Prepare the instrument for measurement as follows:

- Unpack the instrument by removing the dust protection sleeve from the instrument tube holder.
- Place the battery in the instrument as described in the "BATTERY REPLACEMENT" chapter.
- Place the instrument on a flat table.
- Do not place the instrument under direct sun light.

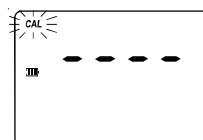
MEASUREMENT PROCEDURE

To compensate the meter for the sample turbidity or color, the measurement takes place in two phases. First, the meter is calibrated. After the sample is prepared, the sample is measured.

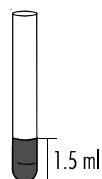
- Turn the meter on by pressing **ON/OFF**. The display briefly shows all tags on.



- When the beeper sounds briefly and the LCD displays dashes, the meter is ready. The blinking **"CAL"** indicates that the instrument needs to be calibrated first.

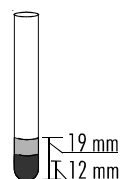


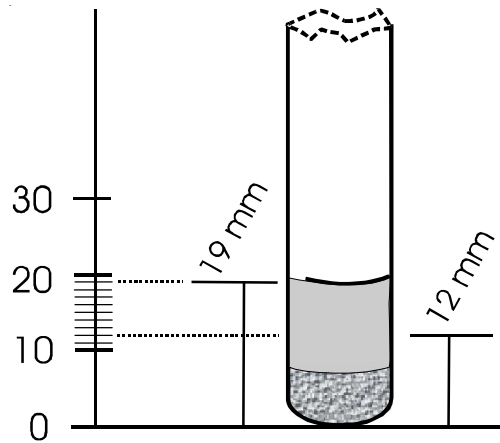
- Fill a standard 10 mm tube with 1.5 ml of the blood sample.



- Use a centrifuge to separate the blood cells from the plasma and to obtain a clear supernatant of plasma, without any turbidity or suspended blood cells.

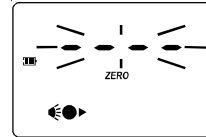
- Please verify that the height of the deposits does not exceed 12 mm (from the bottom of the tube), and that the tube is filled with plasma, up to, at least, 19 mm.



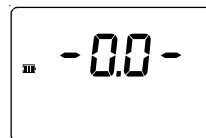


SCALE 1:1

- Press **CAL** and the lamp, tube and detector icons will appear on the display, depending on the measurement phase.

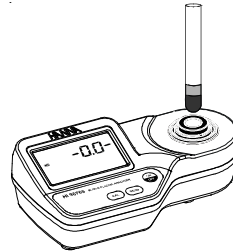


- Wait for a few seconds and the display will show **"-0.0-"**. The meter is now calibrated and ready for measurement.

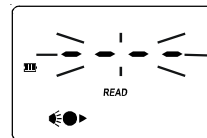


NOTE: If the **"CAP"** message appears, then there is too much ambient light. Please place the light blocking cap and press CAL again.

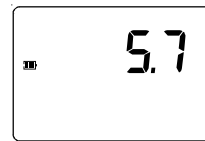
- Insert the centrifuge tube into the holder.



- Press READ and the lamp, tube and detector icons will appear on the display, depending on the measurement phase.



- The instrument directly displays the Blood Plasma Quality Units on the Liquid Crystal Display.



INTERFERENCES

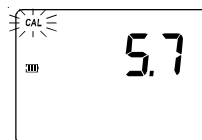
Suspended blood cells and solids: repeat pretreatment.

Strong ambient light: use the light blocking cap for calibrating the instrument, and while taking readings.

BATTERY MANAGEMENT

To save battery, the instrument shuts down after 10 minutes of non-use.

If a valid measurement was displayed before auto-shut off, the value is displayed when the instrument is switched on. The blinking "CAL" means that a new calibration has to be performed.



One fresh battery lasts for around 750 measurements, depending on the light level.

The remaining battery capacity is evaluated at the instrument startup and after each measurement.

The instrument displays a battery indicator with three levels as follows:

- 3 lines for 100 % capacity
- 2 lines for 66 % capacity
- 1 line for 33 % capacity
- Battery icon blinking if the capacity is under 10 %.

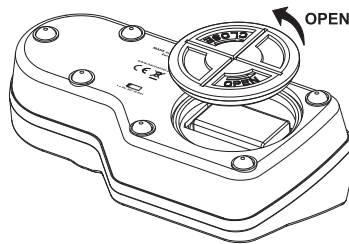
If the battery is empty and accurate measurements can't be taken anymore, the instrument shows "**dead batt**" and turns off.

To restart the instrument, the battery must be replaced with a fresh one.

BATTERY REPLACEMENT

To replace the instrument's battery, follow the steps:

- Turn the instrument off by pressing **ON/OFF**.
- Turn the instrument upside down and remove the battery cover by turning it counterclockwise.



- Extract the battery from its location and replace it with a fresh one.
- Insert back the battery cover and turn it clockwise to close.

ACCESORIES

| | |
|-----------|-----------------------------------|
| HI 721310 | 9V battery (10 pcs) |
| HI 731318 | Cloth for wiping cuvettes (4 pcs) |
| HI 741218 | Carrying case |

WARRANTY

HI 96765 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered. If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service Department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

Recommendations for Users

Before using these products, make sure that they are entirely suitable for your specific application and for the environment in which they are used.

Operation of these instruments may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.

To avoid damages or burns, do not put the instrument in microwave oven. For yours and the instrument safety do not use or store the instrument in hazardous environments.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.