

Biodiesel Photometer
DP 800
Operating Manual
Version 5.11
Edition 2024-01

Dear customer,

We are pleased that you have chosen the Biodiesel Photometer from Diaglobal GmbH and thank you for the confidence you have placed in us.

The Biodiesel Photometer belongs to a new generation of small mobile devices developed by Diaglobal GmbH and specially designed for on-site analysis.

The Biodiesel Photometer can be used to determine the parameters triglycerides and glycerol as a quick single measurement as well as a series measurement.

The kits and accessories required for the test are also available from Diaglobal GmbH.

All the best for your work with the new Biodiesel Photometer!

Yours
Diaglobal GmbH

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1. General information on the Photometer

Device name: Biodiesel Photometer
Model: DP 800
Features: Measuring device for the determination of triglycerides and glycerol

Manufacturer:



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The conformity of the device with Directive 2006/95/EC is confirmed by the use of the CE marking.

2. Installation

For trouble-free operation of the device, the following environmental conditions must be met:

- Ambient temperature: 0 °C ... 40 °C
- No direct exposure to sunlight or similar sources of radiant heat
- Free from excessive dust
- Free from vibrations
- Free from interference by electromagnetic waves
- Operation on a horizontal surface

Please observe the following instructions for use:

Insert a rechargeable battery or normal battery if the device is to be operated independently of a power supply or connect the photometer to a power supply unit.

Press the **<ON/ENTER>** key (Fig. 1) to switch the device on. The device is then immediately ready for measurement.

3. Description of the device

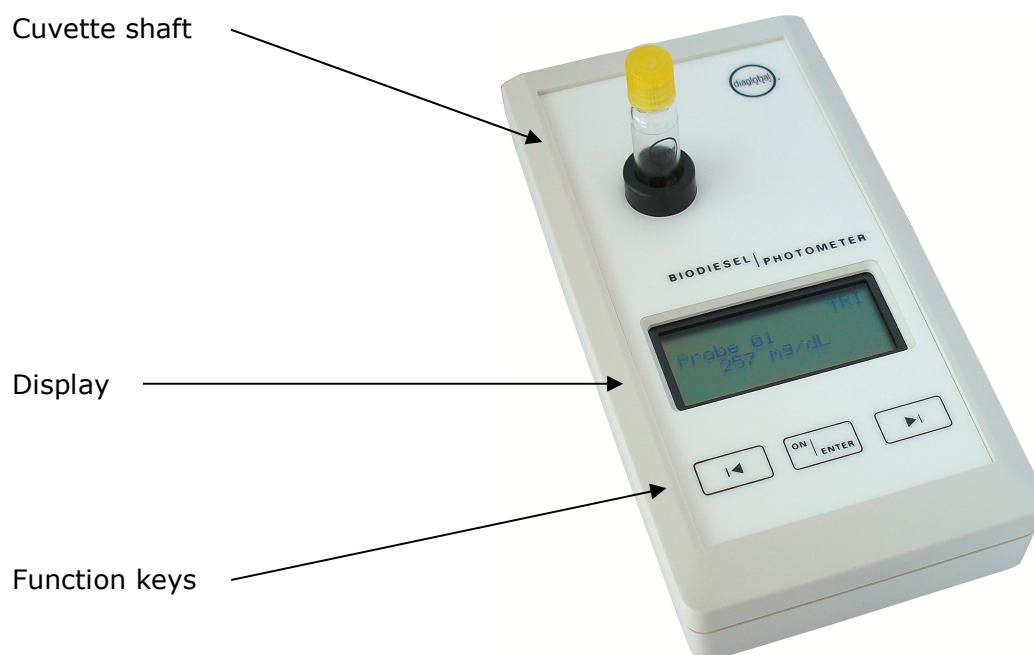


Fig. 1

3.1. Power supply

The Biodiesel Photometer can be operated as desired using a power supply, a (9V block) battery or (model 6F22 or PP3) rechargeable battery.

3.1.1 Mains power operation

The Photometer is supplied with a power supply unit for operation on a mains voltage in the range of 100 V ... 240 V AC. The mains plug is marked with a Diaglobal logo (sticker).

The connector plug of the power supply unit is connected to the power supply socket on the back of the device.

3.1.2 Mains-independent operation

To insert the rechargeable battery or the normal battery:
Unscrew the knurled screws on the bottom of the unit and remove the battery compartment cover. Connect the battery to the push-button contact and insert it into the device. Replace the battery compartment cover and screw in the knurled screws.

Please note:

The Biodiesel Photometer can be operated using a power supply without the need to remove the rechargeable battery or the normal battery.

The rechargeable battery cannot be charged while it is installed. A separate battery charger is required for this purpose.

3.2 Measuring system

The optical section is shown in Fig. 2.

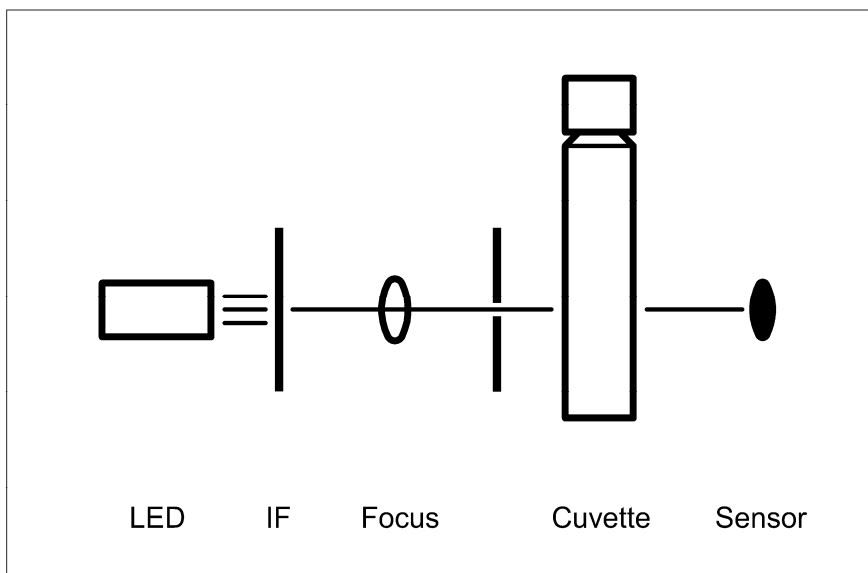


Fig. 2

The light emitted by an LED is first selected into its wavelength range (520 nm) by an interference filter IF (FWHM \sim 5 nm) and then bundled and directed onto the cuvette in the shaft. After passing through the cuvette, a broadband photosensor converts the light falling on its sensor surface into a current, proportional to the intensity.

4. Service

4.1 Adjustment and calibration

The device is adjusted and calibrated at the factory on delivery, adjustment by the customer is not necessary.

Adjustment is carried out via the interface socket on the rear panel. It can only be carried out at the factory, adjustments by the customer are not possible.

4.2 Maintenance

The device is maintenance-free. Maintenance after the warranty period is recommended, but not mandatory.

4.3 Cleaning instructions

Commercially available decontaminating solutions commonly used in clinical chemistry laboratories, such as Mikrozid® AF Liquid, Bacillol® plus, 3 % Kohrsolin® or similar, are recommended for cleaning the device and the surface. Before cleaning the unit with a soft cloth and the decontaminating solution, it must be switched off and the electrical power supply must be disconnected.

Make sure that no liquids get into the device. There is no protection against penetrating liquids (Code IP X0).

The cuvette shaft must not be cleaned by the user of the device, as this may damage the device. If cleaning is necessary, especially because of leaking liquids or broken glass, please contact Diaglobal GmbH.

4.4 Malfunctions

If any malfunctions or problems occur, simply call us. Most questions can be answered on the phone. Non-functional units should be sent to our Berlin address. We will provide a loan device for the duration of the repair.

4.5 Disposal

Diaglobal GmbH will take back and dispose of units that are no longer needed or cannot be repaired, free of charge.

5. Required reagents and laboratory accessories

5.1 Expiration date of consumables

It is important to ensure that all consumables may only be used within the expiration date.

5.2 Reagents / parameter list

The following tests can be measured by the Biodiesel Photometer:

Parameter	Tests / pack	Art. no.
Triglycerides	40	TRI 742
Glycerol	40	GLY 742

5.3 Laboratory aids and accessories

Art. no.	Description	Contents
LH 006	Cuvette rack	1
LH 007	Micropipetter (pipetting aid)	1
LH 026	Capillaries 10 μ L, with ring mark	250
LH 027	Capillaries 1-5 μ L, with ring mark	250
LH 032	Accessories box for dilution of biodiesel	1
LH 047	Capillaries 50 μ L, end-to-end	100

The reagent kits and laboratory aids are supplied by Diaglobal GmbH and can be stored and transported together with the Biodiesel Photometer in a practical case.

6. Measuring procedure

Multipoint measurement with consideration of the sample blank value and recognition of the endpoint

After measuring the sample blank value (= measurement 1) the colour reaction in the cuvette is started. The reaction process is monitored by the device (= measurement 2). The measuring process is terminated as soon as the endpoint is reached.

The time needed to reach the endpoint depends on the temperature. It is normally 2 minutes for the triglycerides and glycerol test. If temperatures are close to freezing point, measuring times can take up to 20 minutes, depending on the parameters.

You can choose between single and series measurements.
For single measurements, the samples are processed one after the other.
For series measurements, all A1 values are measured first.

Triglycerides:

Reagent for quantitative determination of triglycerides in biodiesel.

Mode <TRI>

Calculation: $\Delta A \times \text{Factor} = \text{TRI} [\text{g/dL}]$
Measuring range: 0.1 - 15.0 g/dL

Dilute when exceeding the measuring range:

If the measuring range is exceeded (display: > 15 g/dL) dilute the sample with freed biodiesel 1+10 and repeat the measurement in mode <TRI conc.> with 1 µL diluted sample.

Mode <TRI conc.>

Calculation: $\Delta A \times \text{Factor} \times 11 = \text{TRI} [\text{g/dL}]$
Measuring range: 1.1 - 165 g/dL

Glycerol:

Reagent for quantitative determination of glycerol in biodiesel and in aqueous glycerol solutions.

Mode <GLY org.>

Calculation: $\Delta A \times \text{Factor} = \text{GLY} [\text{mg/dL}]$
Measuring range: 0.001 - 0.250 Ma%

$\text{GLY} [\text{Ma\%}] = c [\text{mg/dL}] / \text{density (biodiesel)} / 1000$
Density of biodiesel: 0.8776 g/cm³

Mode <GLY aqu.>

Calculation: $\Delta A \times \text{Factor} = \text{GLY} [\text{mg/dL}]$
Measuring range: 12.6 - 126 mg/dL resp. 10 - 100 %

7. Measurement

7.1 Switching the device on

Press the **<ON/ENTER>** key.

7.2 Test selection

Press the **<ON/ENTER>** key.

The desired test is selected from the menu with the right or left arrow key:

TRI - TRI conc. - GLY aqu. - GLY org. - ABS520

Pressing the right arrow key activates the next test while pressing the left arrow key returns to the previous test. The selected test is shown in the upper right corner of the display.

Confirm test selection with the **<ON/ENTER>** key.

7.3 Switching the device off

To switch the device off, press both arrow keys simultaneously.

7.4 Integrated operational device checks

Differential measurements

All measurements are based on differential measurements. I. e. after selecting the desired test, the device requests a zero measurement with a blank value cuvette. This creates a reference base to the measured value so that minor deviations can be compensated.

Measuring range controls

The measuring ranges of all measurement results shown in the display are verified by an integrated measuring range control. If the measuring range is exceeded, an error is displayed.

The measuring ranges that are separately defined for each parameter are documented on the respective package inserts as well as in this operating manual, chapter 8, Technical Data.

Plausibility controls

For multi-point measurements, the absorbance measured first forms the reference basis. The programme verifies the plausibility of the individual measured values. If specific requirements (e.g. $A_2 > A_1$ for ascending reactions) are not met, an error message is displayed.

8. Technical data

Storage temperature:	-20 °C ... 70 °C
Operating temperature:	0 °C ... 40 °C
Dimensions:	200 x 100 x 50 mm
Weight:	450 g
Measuring principle:	Absorption measurement with single beam photometer (Fig. 2), chopped operation
Projector:	LED
Spectral apparatus:	Interference filter
Measuring wavelength:	520 nm
Spectral half-width value:	~ 5 nm
External light influence:	Negligible
Interface:	V24 (9600, 8, n, 2)
Power supply:	6 V ... 12 V DC
Current consumption:	max. 250 mA
Warm-up time:	0 min
Interference suppression:	According to DIN VDE 0871 and DIN VDE 0875
Inaccuracy:	< 0.5 % at A = 1.000
Relative photometric short-time standard deviation:	< 0.1 %

Measuring ranges	<u>DP 800</u>
TRI	0.1 - 23.0 g/dL
TRI conc.	1.1 - 165 g/dL
GLY aqu.	12.6 - 200 mg/dL 10 - 110 %
GLY org.	0.001 - 0.250 Ma%
ABS 520 nm	A = 2.500

9. General guidelines, standards and notes

1. Low-Voltage Directive 2006/95/EC
2. EN ISO 9001, Quality Management Systems, Model for quality assurance in design, development, production, installation and customer service
3. EN 61010 -1, Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
4. EN 61326 -1, Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

Note on electromagnetic compatibility

The photometer meets the requirements for electromagnetic radiation and interference immunity as described in the IEC 61326 series of standards.

Do not use this device near sources of intense electromagnetic radiation because they may interfere with correct functioning. A distance of at least 1 m should be maintained between an operational (switched on) mobile phone and the photometer during measurement.

Note on the unit's internal quality control

The functionality of the device is checked when it is switched on. In addition, electronically controlled checks are carried out for individual tests during the measurement, which leads to an error message if specified requirements are not met.

10. Appendix: "Step-by-step measurement"

See the following pages

Step by step instructions

Device manual



1. Switch on:
 Press ON/ENTER key
 Wait for device check and confirm with ON/ENTER



2. Select test:
 Press arrow key until required test appears



3. Confirm required test:
 Press ON/ENTER



4. Switch off:
 Press both arrow keys at the same time

Note:
 If SERVICE appears in the display after the device check, the device has a defect. In this case, please contact our customer service at +49 (0) 30 6576 2597.

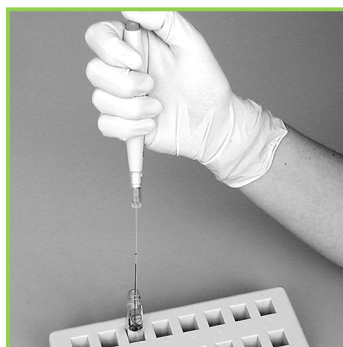
Step by step instructions

TRI 742 (TRI / TRI conc.)

Single measurement



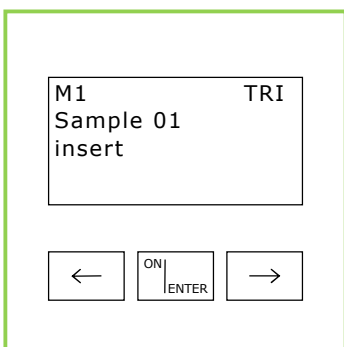
1. Insert capillary with 1 μ L sample into cuvette



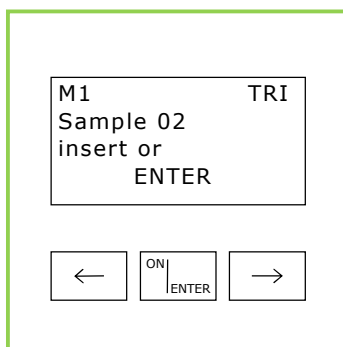
2. Eject sample several times with micropipetter into cuvette



3. Screw cap on
Turn cuvette upside down several times



4. Switch photometer on with ON/ENTER key
Wait for device check, confirm with ON/ENTER
Select the required test, confirm with ON/ENTER



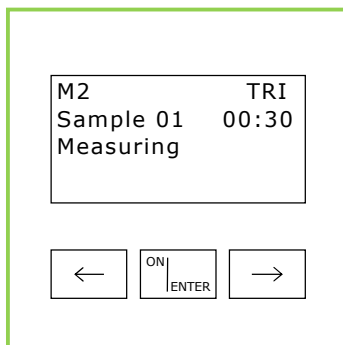
5. Zero point adjustment: Insert cuvette with sample (Fig. 3) into photometer, zero point is stored in memory
Remove cuvette after signal tone



6. Replace screw cap with starter cap



7. Turn cuvette upside down several times



8. First press ON/ENTER
Then insert cuvette into photometer



9. Time is displayed, wait for measured value

Step by step instructions

TRI 742 (TRI / TRI conc.)

Serial measurement

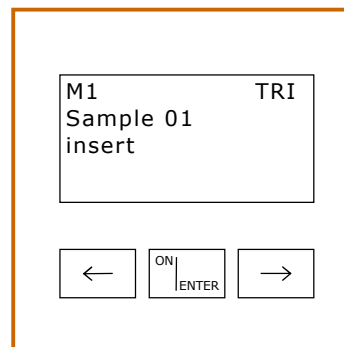
Number of samples per series: Up to 20 samples at the same time



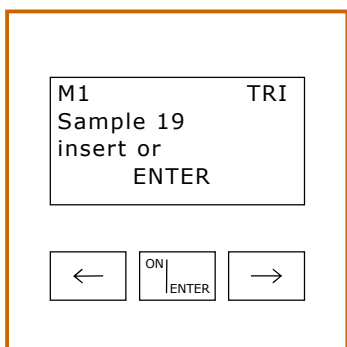
1. Eject all samples one after the other several times with micropipetter into cuvette



2. Screw all caps on again
Turn cuvettes upside down several times



3. Switch photometer on with ON/ENTER key
Wait for device check, confirm with ON/ENTER
Select the required test, confirm with ON/ENTER

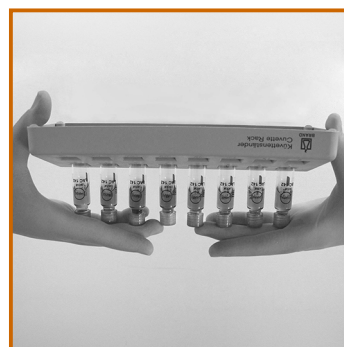


4. Zero point adjustment: Insert cuvettes with samples (Fig. 2) one after the other into photometer, all zero points are stored in memory

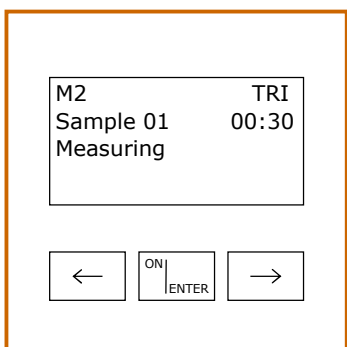
Note: Ensure the correct order of the samples!



5. After the zero point adjustment of the last cuvette replace all screw caps with starter caps



6. Turn all cuvettes **simultaneously** upside down, repeat several times



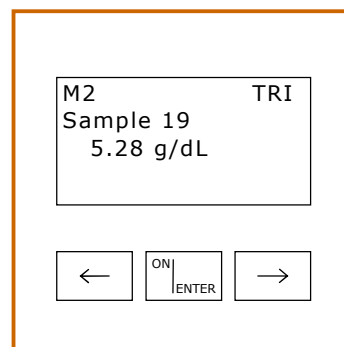
7. First press ON/ENTER key
Then insert 1st cuvette into photometer

Time is displayed, wait for measured value



8. Read the measured value of the 1st cuvette, remove cuvette

Insert 2nd cuvette, read the measured value, remove cuvette, and so on



9. Insert the last cuvette, read the measured value, remove cuvette

Note: Ensure the correct order of the samples!

Step by step instructions

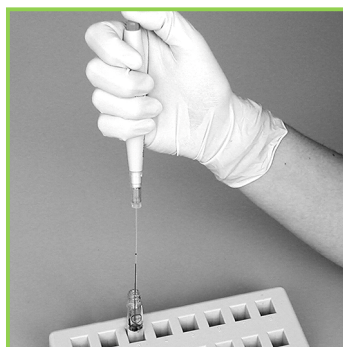
GLY 742 (GLY aqu. / GLY org.)

Single measurement

Note: Before measurement, prepare the sample according to the package insert



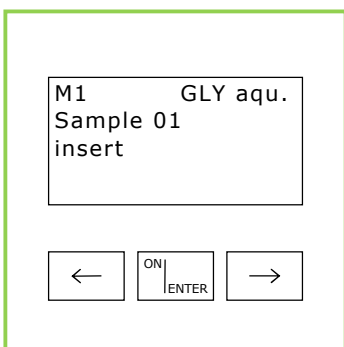
1. Insert capillary with 10 μ L sample into cuvette



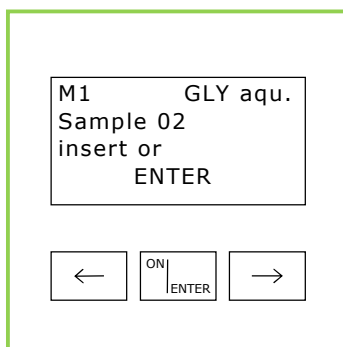
2. Eject sample several times with micropipetter into cuvette



3. Screw cap on
Turn cuvette upside down several times



4. Switch photometer on with ON/ENTER key
Wait for device check, confirm with ON/ENTER
Select the required test, confirm with ON/ENTER



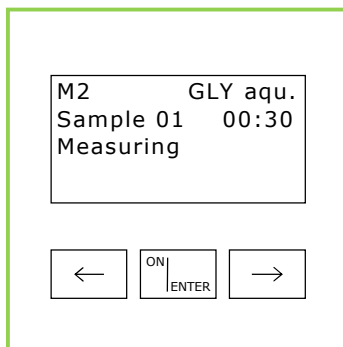
5. Zero point adjustment: Insert cuvette with sample (Fig. 3) into photometer, zero point is stored in memory
Remove cuvette after signal tone



6. Replace screw cap with starter cap



7. Turn cuvette upside down several times



8. First press ON/ENTER
Then insert cuvette into photometer



9. Time is displayed, wait for measured value

Step by step instructions

GLY 742 (GLY aqu. / GLY org.)

Serial measurement / Number of samples per series: Up to 20 samples at the same time

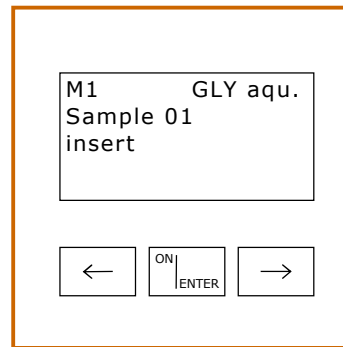
Note: Before measurement, prepare the sample according to the package insert



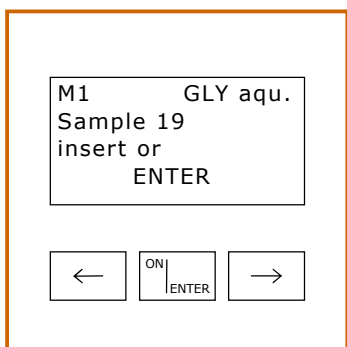
1. Eject all samples one after the other several times with micropipetter into cuvette



2. Screw all caps on again
Turn cuvettes upside down several times



3. Switch photometer on with ON/ENTER key
Wait for device check, confirm with ON/ENTER
Select the required test, confirm with ON/ENTER



4. Zero point adjustment: Insert cuvettes with samples (Fig. 2) one after the other into photometer, all zero points are stored in memory

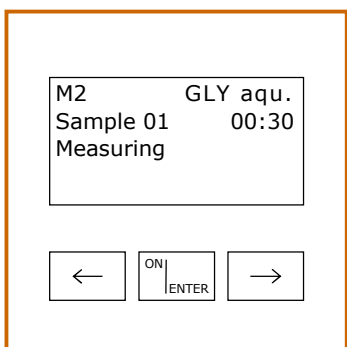
Note: Ensure the correct order of the samples!



5. After the zero point adjustment of the last cuvette replace all screw caps with starter caps



6. Turn all cuvettes **simultaneously** upside down, repeat several times



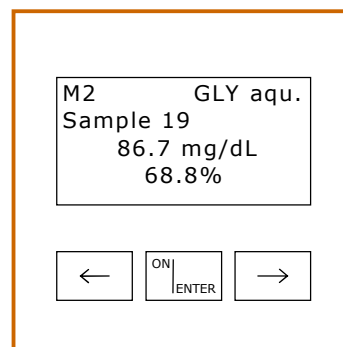
7. First press ON/ENTER key
Then insert 1st cuvette into photometer

Time is displayed, wait for measured value



8. Read the measured value of the 1st cuvette, remove cuvette

Insert 2nd cuvette, read the measured value, remove cuvette, and so on



9. Insert the last cuvette, read the measured value, remove cuvette

Note: Ensure the correct order of the samples!