

Maltose⁷ & Glucose

DirectSens®
Maltose & Glucose
Biosensor Kit
to be used with the
DirectSens® Reader T4

Product No. MK0101

User Manual

Version: 2.0

DirectSens®

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The **DirectSens® Maltose & Glucose Biosensor Kit** enables fast and accurate quantification of maltose and glucose in food and beverage samples.

The measurement is based on an optimized enzyme for glucose detection, immobilized on a disposable biosensor strip. In combination with the **DirectSens® Reader T4**, the glucose concentration can be measured accurately.

Specifications

Measuring range:	1 – 120 g/L glucose and maltose
Measuring time:	≈ 12 minutes (after stock dilution)
Sample volume:	min. 100 µL
Repeatability:	≤ 4 % st. dev. glucose; ≤ 6 % st. dev. maltose
Reproducibility:	≤ 6 % st. dev. glucose; ≤ 8 % st. dev. maltose
Shelf life:	12 months at 2 – 8 °C (36 – 46 °F)
Validated matrices:	oat, rice and spelt drinks, oat- and rice-based products with common additives (e.g., cocoa, coconut), oat base concentrate (liquid and solid)
Cross Sensitivities:	The following concentrations did not have a significant influence on the maltose & glucose results (1+49): sucrose, fructose, maltotriose and lactose up to 60 g/L each; raffinose up to 10 g/L; calcium up to 1.25 g/L; vitamin C up to 0.125 g/L; vitamin D up to 50 mg/L.

General Hints

- Perform the measurements at room temperature 20 – 24 °C (68 – 75 °F).
- Do not combine components from kits with different batch numbers.
- Close the biosensor strip vial immediately after taking out a biosensor strip.

- Make sure that starch hydrolyzing enzymes from manufacturing – which potentially remain in the sample – are inactivated prior to starting the measurement procedure (e.g. by heat treatment).
- Prevent microbial contamination in buffer and control solutions.
 - Always use fresh and clean pipette tips.
 - Close bottles and vials directly after taking out the liquid.
- Avoid spilling liquids into the reader. This may cause damage to the instrument.

01. Materials

DirectSens® Maltose & Glucose Biosensor Kit

- 50 Maltose & Glucose Biosensor Strips
- 1 vial (8 mL) of Glucose Buffer
- 2 vials (each 1.6 mL) of Maltose Buffer
- 1 vial (1.8 mL) of Maltose & Glucose Control Solution
- Manual
- Quality Assurance Certificate

Additionally Required Materials

- **DirectSens® Reader T4**
- Vials, pipettes, tips for product dilution and sample application
- Deionized water
- Incubator (53 °C / 127 °F) e.g. water bath, heat block
- **Optional:** Laptop or PC with DirectSens® Biosensor Software installed

02. Sample preparation

2.1. Preparing the stock dilution

Dilute the sample **1 + 4**, **1 + 49** or **1 + 99** with deionized water, depending on the expected glucose and maltose concentration of the tested sample. Typically, 100 µL sample are diluted with 400 µL, 4900 µL or 9900 µL water using precision laboratory pipettes. Make sure to mix thoroughly.

Range glucose	Range maltose	Dilution factor	Dilution
1 – 10 g/L	1 – 10 g/L	1 + 4	200 µL sample + 800 µL water
2 – 60 g/L	6 – 60 g/L	1 + 49	100 µL sample + 4900 µL water
4 – 120 g/L	12 – 120 g/L	1 + 99	100 µL sample + 9900 µL water



The same stock dilution must be used for the glucose and maltose determination of each sample.

2.2. Preparing the glucose measuring solution (vial 1)

- Mix 100 µL stock dilution with 100 µL glucose buffer.
- Mix thoroughly e.g. by taking the liquid up and down 5 times with the pipette or vortexing.

2.3. Preparing the maltose measuring solution (vial 2)

- Mix 100 µL stock dilution with 100 µL maltose buffer
- Mix thoroughly by taking the liquid up and down 5 times with the pipette. **Do not vortex the vial with the maltose measuring solution!**



Do not upscale the volume of the maltose buffer reaction. For replicate measurements, prepare individual mixtures.

2.4. Incubating the maltose measuring solution (vial 2)

- Incubate the maltose measuring solution (vial 2) at 53 ± 3 °C (127 ± 5 °F) for 10 minutes. Use e. g. an electrical incubator or a water bath.

03. Measurement

3.1. Switching on the reader

- Press the on/off button for a few seconds until the display is activated.
- Press the **Measure** button.

3.2. Transferring the calibration constants and inserting sample information

- Select the user and press **Select**.
- Point the red light of the QR scanner directly onto the QR code of the biosensor vial (distance 10 – 20 cm / 4 – 8 inch) until the next screen appears. The calibration constants are transferred via the QR code.
- Press **Continue**.
- Scan or alternatively type in the sample name. Then press **OK**.
- Select the concentration range according to the selected **stock dilution factor** and then press **Select**.



The calibration constants are specific for each batch of the Biosensor Kit. Always use the QR code of the currently used kit.

3.3. Measuring Glucose

- Take one biosensor strip out of the biosensor strip vial and close the vial.
- **Avoid touching the sensitive area on the biosensor strips!**
- Take the biosensor strip with the blue side upwards and the metal contacts pointing towards the reader and insert it into the reader as far as it can go.
- Confirm by pressing **Continue**.
- Apply 100 μ L glucose measuring solution (vial 1) with a pipette onto the sensitive area of the biosensor strip.
- Apply the complete sample at once and distribute it evenly over the sensitive area using a swift circular motion.
- Make sure to cover the complete sensing area within the 15 seconds sample application step.





Avoid pipetting the sample up- and down on the biosensor. Avoid scratching the central black spot with the pipette tip.

- The reader will automatically detect the sample and start the measurement. The measurement will take approximately 30 seconds. **Do not touch the biosensor during this step!**
- Remove the Biosensor and continue by clicking **Continue** or **Stop** if you do not need a maltose result for the measured sample.

3.4. Measuring Maltose

- Repeat step 3.3 using a second biosensor strip and the maltose measuring solution (vial 2) after the incubation at 53 °C (127 °F) was completed.

3.5. Viewing the result

- After measurement, the result is displayed for glucose and maltose.
- Press **Continue** to initiate a new measurement (start from step 2.1) or press **Stop** to terminate the measurement sequence.
- On the T4 start screen, use the **Browse** function to review previously stored measurement results.

04. System performance checks

4.1. Performing a control solution test



The control solution imitates a 1 + 49 diluted sample. Therefore, a pre-dilution with deionized water is not applicable.

- In the start-up screen of the reader T4, press on **Control**.
- Follow the measurement procedure (steps 2.2 to 3.5) to perform the control solution measurement.
- The target result both for glucose and for maltose is between 25.5 and 34.5 g/L (95% confidence interval).



- Perform a control solution test in case there is any doubt about the performance of the biosensor kit, e.g. due to elevated temperatures during transport or storage or due to unexpected results.
- Adapt the frequency of the regular control solution tests to your laboratory's quality guidelines. Best practice is to do a control solution test as first measurement when opening a new biosensor kit.

4.2. Performing a reader test

The DirectSens® Reader T4 Kit contains an electronic testing device T4. This device can be used for a 3-minute check-up of the electrical measuring characteristics of the reader. In order to perform a reader test, the reader must be connected to the DirectSens Biosensor Platform Software via USB or Bluetooth. For detailed information please read the **DirectSens® Reader T4 Kit and Software User Manual**.



- Perform the reader test in case there is any doubt about the reader performance. This can be due to exposure to a strong mechanical shock, due to a liquid that entered the reader, or due to unexpected results.
- Adapt the frequency of regular reader test to your laboratory's quality guidelines.

05. Disposal

Do not dispose of test components into drains. Dispose according to local regulations.

06. Further information

On the website of the Maltose & Glucose Biosensor Kit (download section) you find this manual and a tutorial video.

<https://www.directsens.com/products/maltose-glucose/>

For personal support, please contact

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All specifications and procedures are subject to change without notice.



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