

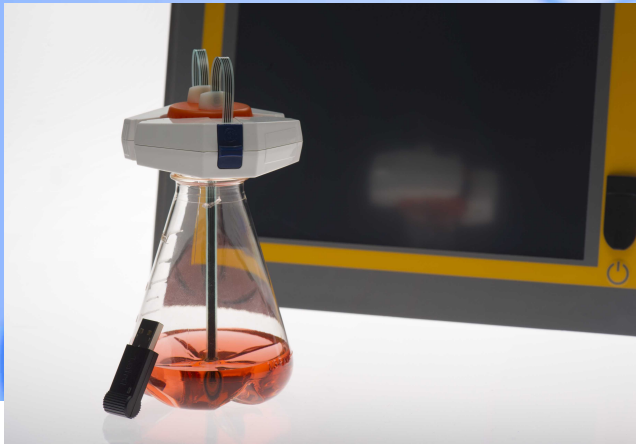


**Our sensors let you
focus on what really
matters**



**Process control
based on
metabolites**

Our unique solution for cell culture monitoring and automated process control



CITSens MeMo Basic Version

- Continuous in situ measurement of glucose and/or lactate
- One tablet with monitoring software and one transmitter
- Bluetooth or wired communication
- Upgradable to Full Version

CITSens MeMo Starter Kits allow continuous in situ measurement of glucose and/or lactate in defined cell culture media as well as in complex matrices, e.g. blood

The CITSens MeMo Basic Version includes one tablet with monitoring software and one transmitter (whether bluetooth or wired).

This version is limited to the use of one transmitter and has no automated process control (APC) software.

It is possible to upgrade the Basic Version to a Full Version in a modular way.

The CITSens MeMo Full Version includes one tablet with monitoring and automated process control (APC) softwares and four transmitters (whether bluetooth or wired).

The affordable sensor system is unique and delivers real-time information on a culture's growth behavior and metabolic state at any time of the process

Process control based on the online measured kinetics of glucose consumption has become reality.

To be used with our screen printed glucose and/or lactate sensors, Smart Disposable Bioreactors, CapSensors, PG 13.5 Process Probes or Flow-Cells.

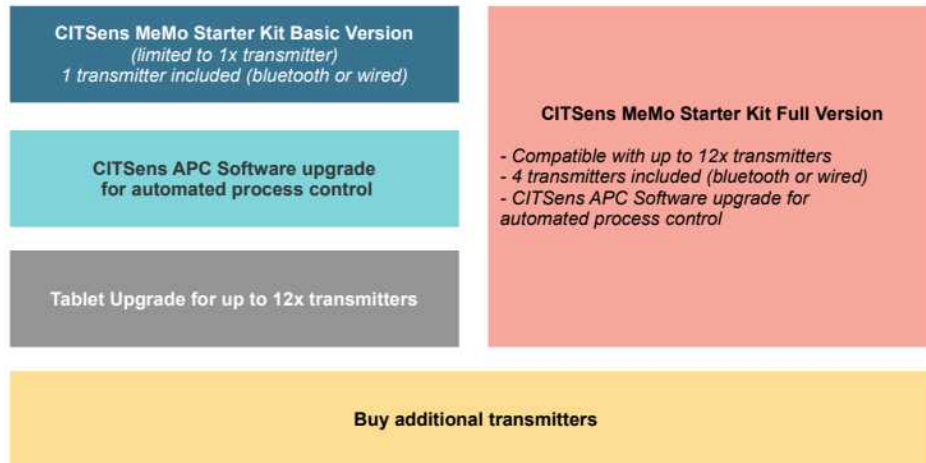


CITSens MeMo Full Version

- Continuous in situ measurement of glucose and/or lactate
- One tablet with monitoring and automated process control (APC) software and four transmitters
- Bluetooth or wired communication



A modular system, with bluetooth or wired transmitters



Bluetooth transmitters

Data is generated at a 20 seconds frequency and continuously sent to a database via wireless communication out of a closed incubator.



USB wired transmitters

Measuring takes place at a 5 seconds interval, allowing not only monitoring but also control of glucose in a narrow concentration range.

No need for software installation or setup. Just plug in and start to measure.

Our consumables from T-Flask to bioreactor scale



CapSensor

Upon request, C-CIT Sensors manufactures Cap Sensors for applications where cells are cultivated in Roller Bottles, T-, Shake- and Spinner-Flasks. All media wetted materials are USP Class VI compliant.



Process Probe PG 13.5

Through its shape the Process Probe easily fits into any stirred bioreactor via PG13.5 threaded lid or side ports. Using PEEK or POM-C as main in-process material, the Process Probe complies with USP Class VI.



Flow Cell Sensor

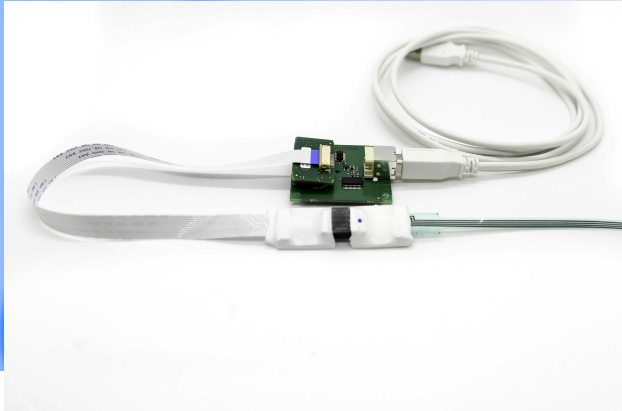
The Flow Cell is designed for tube based reactor systems or any perfusion based bioprocess, allows the culture media to pass through the cell and avoids any cell aggregation in or around the sensor. It is available with our without micropump.



Customized Solutions

All our sensors can be adapted to any customized bioreactor. The measuring electronic as well as the signal transfer can be customized providing full integration capability of the sensor into closed systems or OEM solutions.

Our integration solutions



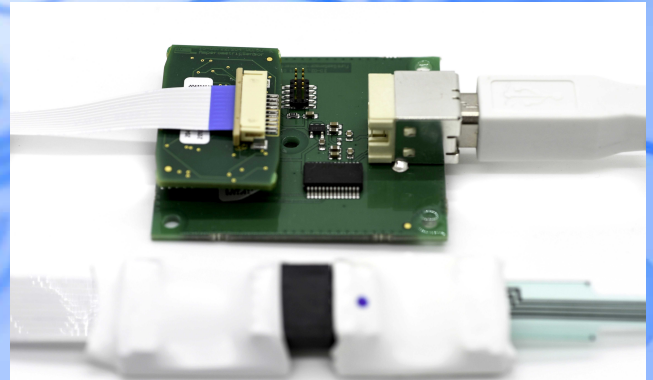
USB wired board

USB wired Board is a standalone measuring module specially designed for direct integration purposes.

The USB wired Board can be connected to any computer supporting virtual COM Port connected by USB or RS232.

Due to its modular design the USB wired Board supports amperometric as well as potentiometric measurements which allows to read out our glucose & lactate sensors as well as pH & NH₄⁺ sensors.

The USB wired Board supports 2 channels read out that allows measuring e.g. glucose & lactate simultaneously and is compatible with all the sensors in the portfolio.



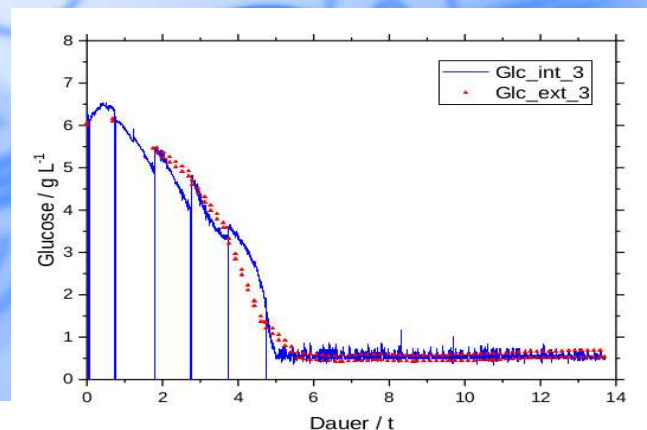
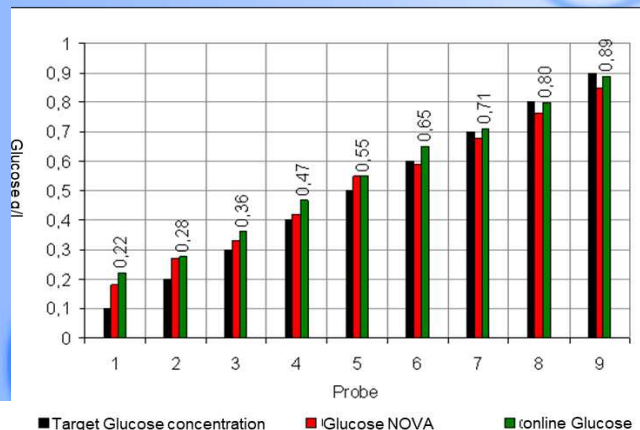
The board comes with a USB and sensor cable, allowing easy connection of our sensor to the board.

Measuring takes place at a 5 seconds interval, allowing not only monitoring but also control of glucose in a narrow concentration range.

There are 3 data readout options available:

1. Free software for Windows or Linux supporting direct raw value readout (raw signal, no g/L signal)
2. Integration into 3rd party systems
3. Integration into self developed process control systems (OEM)

C-CIT Sensors The Company for Cell Culture in situ Technologies



Comparison of off-line and CITSens MeMo in situ measurement

A glucose sensor was integrated in a shaker flask and the flask was filled with a cultivation medium without glucose addition. In a next step, 0.1 g/l glucose were added and the sensor was calibrated within this medium. In parallel, an aliquot of the medium was sampled and analysed with the instrument „Bioprofile“. Subsequently, glucose was added in steps of 0.1 g/l glucose. The sensor response was monitored and interpreted relative to the off-line results of „Bioprofile“.

Automated Process Control based on in situ measured Glucose Concentration

An in situ glucose sensor was used to control processes by direct parameter measured in real time. The sensor was built into a PG 13.5 Plug and was inserted in a 2L SUB. The cultivation time was 14 days. A feed pump was directly connected to the PC of C-CIT Sensors AG and was controlled by the own software. There was no extra process control unit necessary. As shown in the graph the glucose concentration was kept at 0.5 g/l over 14 days. The in situ glucose sensor only shows a small offset compared to the off-line analysis.

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