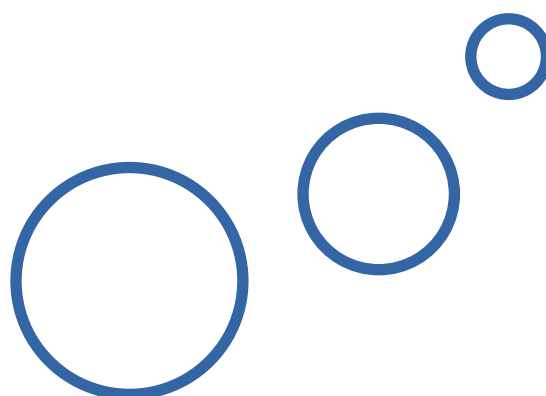




Technical Data Sheet

CITSens MeMo and in situ sensors for SUB's



Content

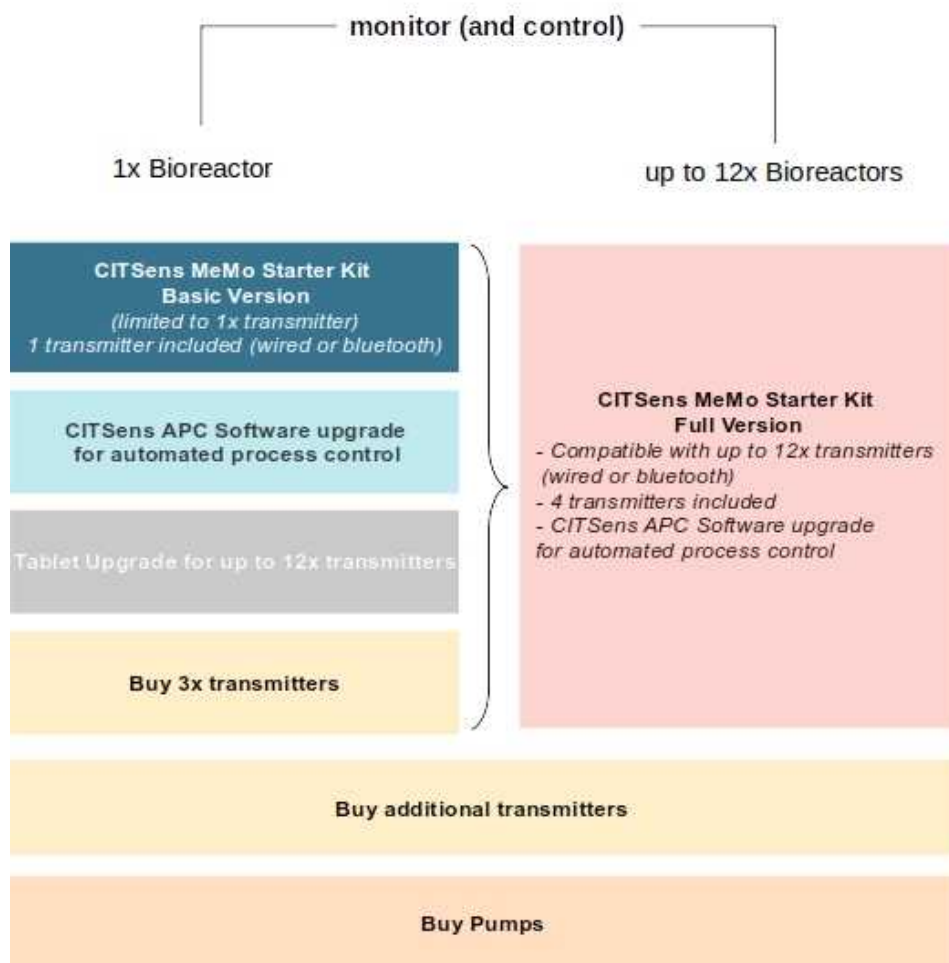
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CHOOSE YOUR SENSOR

Your bioreactor	T-Flask Shake Flask Spinner Flask G-Rex M series and more	SUB with pg13.5 thread	Perfusion Bioreactor, Wave Bag
Your sensor	CapSensor	Process Probe	Flowcell w/ or w/o micropump
Metabolites	Glucose, Lactate, Combi Glucose & Lactate		

CHOOSE YOUR SYSTEM



CITSens MeMo Basic Version



CITSens MeMo Basic Version is an electrochemical, enzyme-based sensor system with the capacity to be used 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.

To be used with our Screen Printed Glucose and/or Lactate Sensor, Smart disposable Bioreactors, CapSensors, PG 13.5 process probe or flow-cell.

The continuous online/in situ measurement of glucose and/or lactate on one sensor as offered by CITSens MeMo adds value to cell line, media and process development projects within the biopharma community. The affordable sensor system is unique and delivers real-time information on a culture's growth behavior and metabolic state at any given time. Data is being generated at a 20 second frequency and continuously sent to a database via wireless communication out of a closed incubator. Using a smartphone, a round the clock observation of your cell culture is here. Through straightforward OPC server connectivity, process control based on the online measured kinetics of glucose consumption and lactate generation has become reality.

The single-use sensor part of the system comes as a standard product (integrated into a Cap of your choice – CapSensor- , as a reactor probe containing a PG13.5 thread or as a flow cell sensor) or can be custom-manufactured depending on your needs. The sensors are delivered double packed and gamma-sterilized and stored at 4 C.

In situ bi-parametric Glucose & Lactate Sensor

Delivery	Gamma irradiated (25 kGy), double packed		
Dimension (SPE)	Length:	230 mm or 330 mm	
	Tip Diameter:	8 mm	
	Thickness:	0.15 mm	
Analytes	Glucose / Lactate combined		
	Glucose		
	Measuring range	0 - 33 mmol/L	0 – 6.0 g/L
	Precision	+/- 0.5 mmol/L	
	Resolution	0.1 mmol/L	
	Lactate		
	Measuring range	0 - 15 mmol/L	0 – 1.35 g/L
	Precision	+/- 0.5 mmol/L	
	Resolution	0.1 mmol/L	

Product Number	Description	Pcs / Unit
3002-1030-BV	CITSens MeMo Starter Kit & License Basic Version	1

CITSens MeMo Full Version



CITSens MeMo Full Version is an electrochemical, enzyme-based sensor system with the capacity to be used in defined cell culture media as well as in complex matrices, e.g. blood.

The CITSens MeMo Full Version includes one tablet with monitoring and automated process control (APC) softwares and four transmitters (whether bluetooth or wired). By purchasing additional transmitters it is possible to monitor and control twelve bioreactors simultaneously.

The APC upgrade brings completely new process control options in order to reduce cell stress by hyper- / hypo-glycemia or high lactate levels. In addition the system allows to increase product yield as well as product quality due to lowered glucose levels and its positive effect on protein expression.

If not used as a process optimization tool, both APC systems enable remote cell culture monitoring / control for bridging weekends without the need of visiting the lab.

The system is capable of communicating with RS232 driven pumps as well as with a micropump using bluetooth connectivity.

For larger bioreactors or cultivation dishes the RS232 peristaltic pump is recommended. The micropump offers the same possibility for small bioreactors (e.g. ShakeFlasks) and can be placed inside the incubator next to the cell culture vessel. The CITSens MeMo Full Version is capable of handling twelve RS232 peristaltic pump or twelve micropumps in parallel.

Data are generated on a 20 second measuring interval. Connecting the system to a 3rd party system via OPC is possible to have full data traceability on your process control system.

To be used with our Screen Printed Glucose or combined Sensor, Smart disposable Bioreactors, CapSensors, PG 13.5 Plug or flow-cell.

Recommended control range:
(Control based on Glucose concentration)

High Glucose: 0.5 – 5.0 g/L
Low Glucose: 0.3 – 2.5 g/L
Combined (Glu/Lac): 0.5 – 5.0 g/L

Pump flow rates:

Micro Pump:

0.7 – 7.0 mL/min

Third party connectivities:

OPC

API for EVE® Infors HT:

ODBC

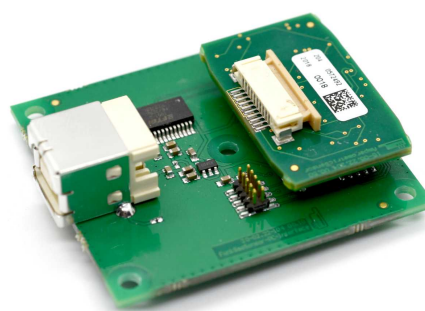
Product Number	Description	Pcs / Unit
3002-1030-APC	CITSens MeMo Starter Kit & License Full Version	1
3002-2030-MP	Micropumps	4
3002-2030-MPCM	Micropump control module quad	1

CITSens MeMo USB our wired solution



CITSens MeMo USB wired Board is a standalone measuring module to be used with our CITSens MeMo system. But the USB wired Board can also 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 channel 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 that allows 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)

To be used with our Screen Printed Glucose and / or Lactate Sensors, Smart disposable Bioreactors, CapSensors, Process Probes or Flow-cells.

Communication:	USB / RS232 Device will be recognized as COM port	
Data type:	Text string, nA_Value_1;na_Value_2\r\n (e.g, 1234;4521\r\n)	
Number of readout channels:	2 separate channels	
Available electronics:	- amperometric board for - potentiometric board for	Glucose/Lactate pH/Ammonia
Measuring interval:	5 seconds	
Sensor connector cable length:	30 cm	
USB cable length:	1.5 meter (included)	
Housing:	available with or without housing (for direct integration)	

Product Number	Description	Pcs / Unit
3002-1030-A	CITSens USB Board & Licence	1

Disposable glucose and lactate sensors for SUB's



CITSens sensors are based on screen printed electrodes which are coated with an immobilized enzyme. The sensor is built into the respective original cap or finished as a PEEK PG13.5 sensor, double packed and subsequently sterilized by gamma-irradiation.

For implementation of the system, the CITSens sensor is connected to the wired or bluetooth transmitter and put into the cell culture. Data measured are transmitted to a receiver and transferred to the Tablet.

Information on a culture's growth behavior and metabolic state at any given time. Data is being generated at a 20 second frequency and continuously sent to a database via wired or wireless communication out of a closed incubator.

Using a smartphone, a round the the clock observation of your cell culture is here.

Continuous and disturbance-free measuring of key metabolic parameters is critical for cell biologists. Cell growth and metabolic activity can be measured instantaneously and such derived data can be used to trigger bioprocess control actions.

It is not only the sophisticated labs of biopharmaceutical companies who benefit from the features offered by CITSens *MeMo* but also the many investigators in the different fields of basic cell biology research. Frequent manual interventions for sample taking or optical examination harm cell cultures and disturb their growth. Negative aspects of disturbing growing cell cultures are:

- lower cell density resulting in lower product yield
- metabolic stress and gene expression due to environmental change (carbon dioxide, temperature, pH Shift, seize of agitation)
- no information on their actual metabolic state by optical inspection
- risk of contamination

To be used with CITSens MeMo Basic or Full Version

Cap Sensor

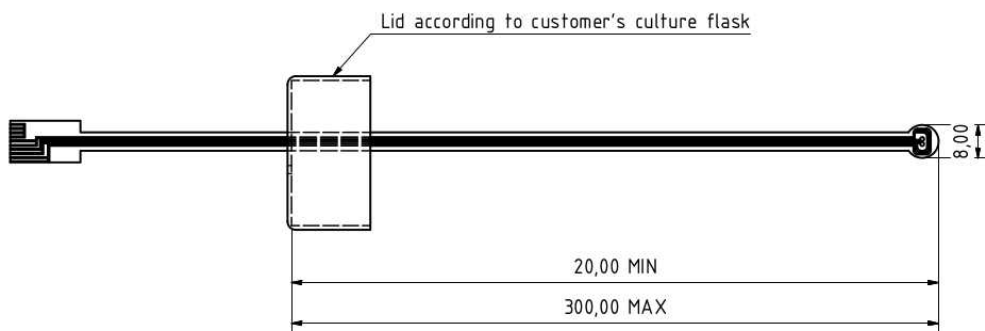


C-CIT Sensors manufactures Cap Sensors for applications where cells are cultivated in G-Rex M Series, T-, Shake, Roller, Spinner-Flasks and more.

Sensor specifications:

Length: 40 – 300 mm

Material: Polymer (USP Class VI) coated screen printed electrode



Product Number	Description	Pcs / Unit
3002-501-HG	CITSens Bio Glucose sensor with cap for high glucose media	24 pieces
3002-501-LG	CITSens Bio Glucose sensor with cap for low glucose media	24 pieces
3002-501-L	CITSens Bio Lactate sensor with cap	24 pieces
3002-501-c-HG/L	CITSens MeMo high Glucose / Lactate combi sensor with cap	24 pieces
3002-501-HGWW	CITSens Bio Glucose sensor with Wilson Wolf P/N 11-00036 cap for high glucose media	24 pieces
3002-501-LGWW	CITSens Bio Glucose sensor with Wilson Wolf P/N 11-00036 cap for low glucose media	24 pieces
3002-501-LWW	CITSens Bio Lactate sensor with Wilson Wolf P/N 11-00036 cap	24 pieces
3002-501-c-HG/LWW	CITSens Bio high Glucose / Lactate combi sensor with Wilson Wolf P/N 11-00036 cap	24 pieces

Process Probe for SUB



The Process Probe is the best choice for any stirred bioreactors.

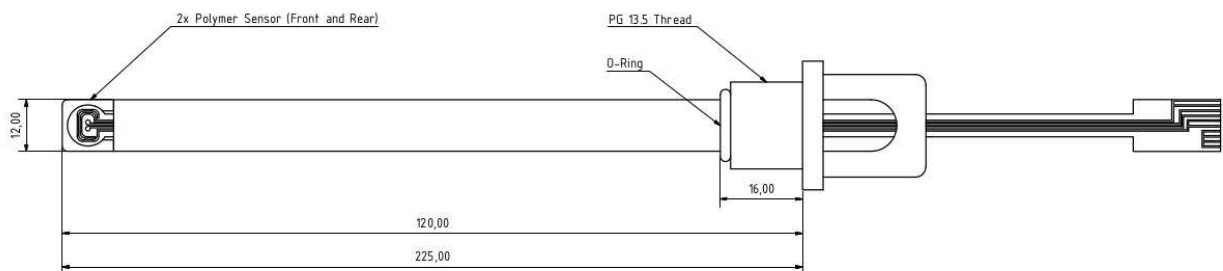
Through its shape which is based on a standard pH-probe, the Process Probe easily fits into any stirred bioreactor via PG13.5 threaded lid or side ports.

Using PEEK or PP as main in-process material, the Process Probe complies with USP VI criteria relevant for cell culture applications.

For larger single use bioreactors the Process Probe can be integrated into standard KLEENPAK connectors to allow aseptic integration.

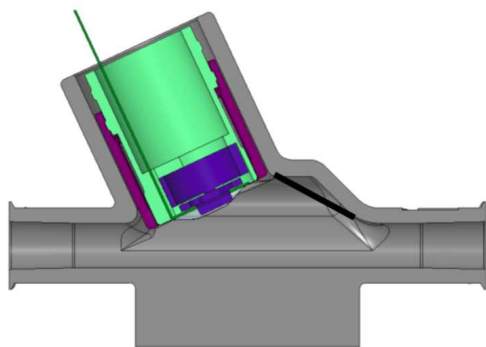
Sensor specifications:

Length:	120 & 225 mm other lengths on request
Material:	PEEK (USP Class VI) PP (USP Class VI)



Product Number	Description	Pcs / Unit
3002-511-HG	CITSens Bio Glucose reactor probe for high glucose media	12 pieces
3002-511-LG	CITSens Bio Glucose reactor probe for low glucose media	12 pieces
3002-511-L	CITSens Bio Lactate reactor probe	12 pieces
3002-511-c-HG/L	CITSens MeMo high Glucose / Lactate combi reactor probe	12 pieces

Flow Cell Sensor



The Flow Through Cell is the best choice for long term monitoring in tube based reactor systems or any perfusion based bioprocesses. Designed with a flat bottom without dead volumes, it allows the culture medium to pass through the cell and avoids any cell aggregation in or around the sensor.

Available with and without micropump

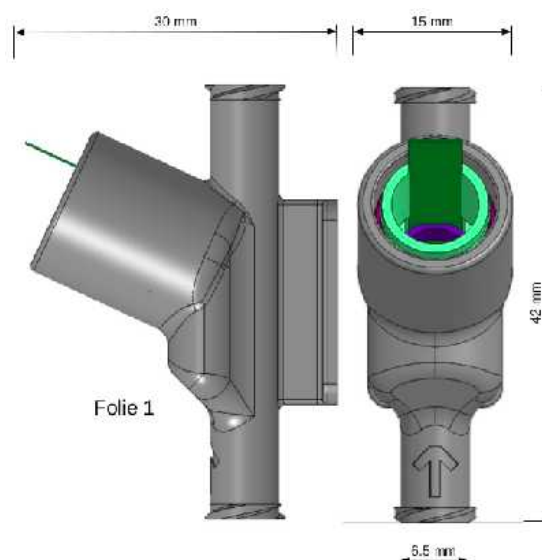
Sensor specifications:

Length:	Given by Flow Through Cell
Material:	Resin Polymer (USP Class VI)
Flow-rate:	8 μ L to 300 mL/min

Connection to Reactor:

LuerLock	Inlet	Female
	Outlet	Female

C-Flex Tubing



Product Number	Description	Pcs / Unit
3002-502-HG	CITSens Bio Glucose flow cell sensor for high glucose media	12 pieces
3002-502-LG	CITSens Bio Glucose flow cell sensor for low glucose media	12 pieces
3002-502-L	CITSens Bio Lactate flow cell sensor	12 pieces
3002-502-c-G/L	CITSens MeMo high Glucose / Lactate combi flow cell sensors	12 pieces
3002-502-HG-MP	CITSens Bio Glucose flow cell sensor for high glucose media with micropump	12 pieces
3002-502-LG-MP	CITSens Bio Glucose flow cell sensor for low glucose media with micropump	12 pieces
3002-502-L-MP	CITSens Bio Lactate flow cell sensor with micropump	12 pieces
3002-502-c-G/L-MP	CITSens MeMo high Glucose / Lactate combi flow cell sensor with micropump	12 pieces
3002-2030-MP502	Micropump Controller for flowcell	1 piece



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