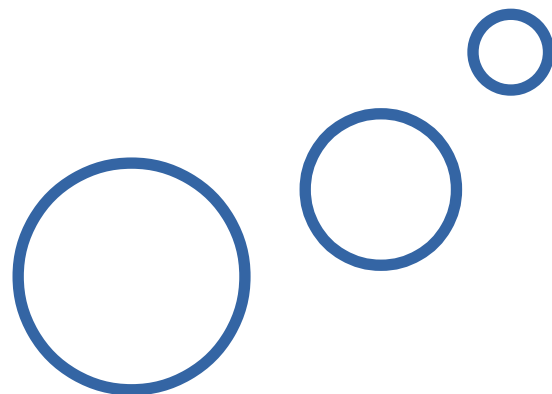




**Technical Data Sheet**  
**CITSens Bio**  
**CITSens MeMo**  
**and in-situ sensors**  
**for SUBs**



**Content**

<b>CITSens <i>Bio</i></b> .....	<b>2</b>
<b>CITSens <i>MeMo</i></b> .....	<b>3</b>
<b>Standard Sensor Products</b> .....	<b>4</b>
<b>Cap Sensor</b> .....	<b>5</b>
<b>Process Probe for SUB</b> .....	<b>6</b>
<b>Flow Cell Sensor</b> .....	<b>7</b>

## CITSens Bio



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

The continuous online/in-situ measurement of glucose and lactate 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/or lactate generation has become reality.

**The benefits are evident: Easy and fast process development at lowest investment and running cost, no risk of contamination, in-time information and automation, better science.**

**The single-use sensor part of the system comes as a standard product (as a reactor probe containing a PG13.5 thread or as a flow cell sensor) or can be custom-manufactured as a cap sensor fitting any of the mostly used brands of cell culture vessels. The sensors are delivered double packaged and gamma-sterilized and stored at 4 C.**

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

### In-situ Glucose or Lactate Sensor

<b>Delivery</b>	Gamma irradiated (25 kGy), double packed		
<b>Dimension (SPE)</b>	Length:	230 mm or 330 mm	
	Tip diameter:	8 mm	
	Thickness:	0.15 mm	
<b>Analytes</b>	Glucose		
	Measuring range	0 - 30 mmol/L	0 – 8.0 g/L
	Precision	+/- 0.1 mmol/L	
	Resolution	0.1 mmol/L	
	Lactate		
	Measuring range	0 - 15 mmol/L	0 – 1.35 g/L
	Precision	+/- 0.1 mmol/L	
	Resolution	0.1 mmol/L	

Product Number	Description	Pcs / Unit
3002-101	CITSens Bio Starter Kit & License	1
3002-1030	CITSens MeMo Starter Kit & License	1



## CITSens MeMo



CITSens *MeMo* 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 continuous online/in-situ measurement of glucose and 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 benefits are evident: Easy and fast process development at lowest investment and running cost, no risk of contamination, in-time information and automation, better science.**

**The single-use sensor part of the system comes as a standard product (as a reactor probe containing a PG13.5 thread or as a flow cell sensor) or can be custom-manufactured as a cap sensor fitting any of the mostly used brands of cell culture vessels. The sensors are delivered double packaged and gamma-sterilized and stored at 4 C.**

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

## In-situ bi-parametric Glucose & Lactate Sensor

<b>Delivery</b>	Gamma irradiated (25 kGy), double packed		
<b>Dimension (SPE)</b>	Length:	230 mm or 330 mm	
	Tip Diameter:	8 mm	
	Thickness:	0.15 mm	
<b>Analytes</b>	<b>Glucose / Lactate combined</b>		
	Glucose		
	Measuring range	0 - 30 mmol/L	0 – 8.0 g/L
	Precision	+/- 0.1 mmol/L	
	Resolution	0.1 mmol/L	
	Lactate		
	Measuring range	0 - 15 mmol/L	0 – 1.35 g/L
	Precision	+/- 0.1 mmol/L	
	Resolution	0.1 mmol/L	
	<b>pH</b>		
	pH		
	Measuring range	4 – 9 pH	
	Precision	+/- 0.1 pH	
	Resolution	0.05 pH	

## Disposable glucose and lactate sensors for SUB's



CITSens *Bio* 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 packaged and subsequently sterilized by gamma-irradiation.

For implementation of the system, the CITSens *Bio* sensor is connected to the radio transmitter and put into the cell culture. Data measured are transmitted to a receiver and transferred to the PC by means of LAN / Bluetooth

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 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 *Bio* 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 *Bio* or CITSens *MeMo***

## Cap Sensor



Upon request, C-CIT Sensors manufactures Cap Sensors for applications where cells are cultivated in T-, Shake, Roller and Spinner-Flasks.

### 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 Bio high Glucose / Lactate combi sensor with cap	24 pieces
3002-501-c-LG/L	CITSens Bio low Glucose / Lactate combi sensor with cap	24 pieces

## Process Probe for SUB



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

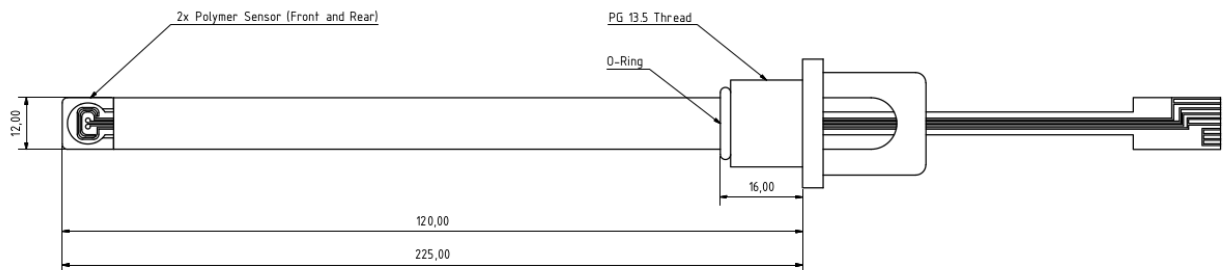
Through its shape which is based on a standard pH-probe, the Process Probe easily fits into any stirred bioreactor via PG13.5 threaded lid or side ports.

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

### Sensor specifications:

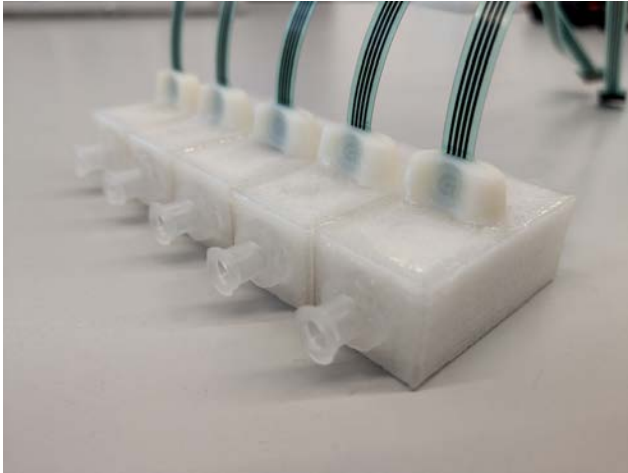
Length: 120 & 225 mm  
other lengths on request

Material: PEEK (USP Class VI)  
POM-C (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 Bio high Glucose / Lactate combi reactor probe	12 pieces
3002-511-c-LG/L	CITSens Bio low 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.

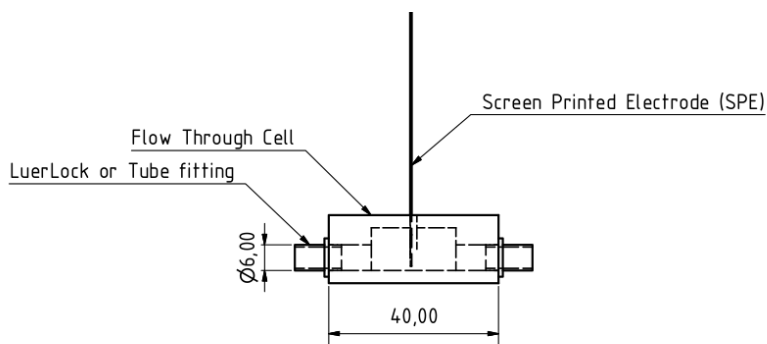
Designed with a flat bottom without dead volumes, it allows the culture medium to pass through the cell and avoids any cell aggregation in or around the sensor.

### Sensor specifications:

Length:	Given by Flow Through Cell
Material:	PETG Polymer (USP Class VI)
Flow-rate:	Up to 100 mL/min


### Connection to Reactor:

LuerLock	Inlet	Male
	Outlet	Female
C-Flex Tubing		




Product Number	Description	Pcs / Unit
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 Bio Glucose / Lactate combi flow cell sensor	12 pieces





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