METERS

O_2 BM pH / CO_2

SFR vario

The SFR vario offers online monitoring of oxygen, biomass and pH or CO_2 - simultaneously. Online measured biomass data can be correlated with parameters like optical density, cell dry weight, or cell concentration. This way it is possible to get real-time information on e. g. OD_{600} development. The device optics can read out one oxygen and one pH or CO_2 (CO_2 Technical Data) sensor spots - integrated in the ready-to-use cultivation vessels - and also comprise a dedicated optical set-up for biomass monitoring. The oxygen uptake rate (OUR) can be calculated from the slope of the online oxygen measurements. The system has two long-lasting, rechargeable batteries, and is compatible with any standard shaking incubators. Up to 4 SFR vario can be controlled from the SFR vario software. Measurement data are transferred wirelessly via Bluetooth to a PC / notebook.

- Simultaneous real-time measurement of O_2, biomass & pH or CO_2
- Automatic OUR calculation
- Online measurement of optical density, cell dry weight, cell concentration by correlation with biomass measurements
- Parallel measurements in up to 4 shake flasks
- Wireless data transfer enables easy integration
- Bioprocess development & media optimization

TECHNICAL

Specifications	Oxygen	pH*	Biomass
Measuring range	0 – 100 % O_2	5.5 – 8.0 pH	Optical Density OD_{600} 1 - 80
Response time (t_{90}) at 25 °C	< 60 sec.	< 60 sec.	-
Resolution	± 0.01 % O_2 at 0.21 % O_2 ± 0.1 % 02 at 20.9 % 02	± 0.01 pH at pH = 7**	Depending on culture
Accuracy	± 0.05 % O_2 at 0.2 % O_2 ± 0.4 % O_2 at 20.9 % O_2	± 0.1 pH at pH = 7 with one-point adjustment ± 0.2 pH at pH = 7 with pre-calibration	Depending on culture
Drift	< 0.01 % O_2 per day (sampling interval of 1 min.)	< 0.01 pH per day (sampling interval of 1 min.)	Depending on culture
Properties			
Temperature range	from + 5 to + 50 °C		
Compatibility	Aqueous solutions, ethanol (max. 10 % v/v), methanol (max. 10 % v/v), pH 2 - 10		
Cross-sensitivity	Typically no cross-sensitivity in culture media	Reduced to ionic strength (salinity); a high concentration of small fluorescent molecules in the visible range can interfere	
Sensor flasks are delivered irradiated			

* provided Sensor Flasks are used without further handling in physiological solutions
** at 100 rpm & in cell culture media

ACCESSORIES

(available for all SFS Sensor Flask sizes)

Clamps Universal SFS

These clamps are used with the SFR Shake Flask Reader and the SFR vario. They ensure that the sensors integrated in the SFS Sensor Flasks are aligned correctly with the reader optics. There are two additional holes in the base plate for the two knobs on the plastic SFS bottom, so the flask will snap into place. Furthermore, the clamp has a recess for the biomass optics of the SFR vario and a sideways arm that holds glass flasks with integrated sensors in the correct position above the optics.

- For glass and plastic flasks with integrated sensors
- For Sensor Flasks from 125 mL to 5000 mL volume

TECHNICAL

Specifications	
Dimensions / Weight	125 mL: ⌀ 70 mm, 45 g 250 mL: ⌀ 85 mm, 80 g 500 mL: ⌀ 100 mm, 125 g 1000 mL: ⌀ 130 mm, 225 g 2000 mL: ⌀ 165 mm, 335 g 3000 mL: ⌀ 230 mm, 700 g 5000 mL: ⌀ 230 mm, 700 g
Compatibility	SFR, SFRvario

SENSORS

(with & w/o baffles)

O_2 pH

Sensor Flask SFS

These single-use shake flasks made of polycarbonate have an oxygen and a pH sensor integrated at the bottom. The flasks are available in sizes from 125 mL to 5,000 mL volumes, with or without baffles. The sensors inside are irradiated and pre-calibrated, so the flasks are ready-to-use. The SFS can be read out with the SFR Shake Flask Reader or the SFR vario, for simultaneous online monitoring of oxygen, pH, OUR and (in case of the SFR vario) biomass. They are used with special clamps that align the integrated sensors with the reader optics.

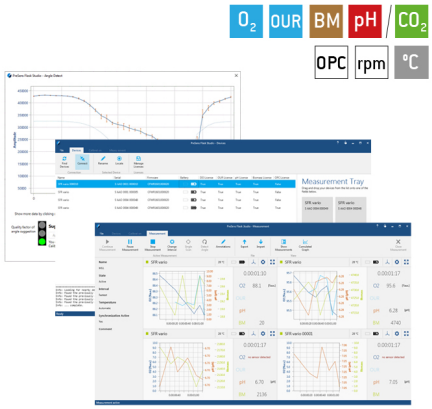
- Online monitoring of O_2 & pH
- Contactless measurement
- Ready-to-use
- Pre-calibrated sensor
- For microbes & cell culture

TECHNICAL

Specifications	Oxygen	pH*
Measurement range	0 - 100 % O_2	HP5: 5.5 - 8.0 pH** LG1: 4.0 - 7.5 pH**
Resolution	± 0.01 % O_2 at 0.21 % O_2 ± 0.1 % O_2 at 20.9 % O_2	± 0.01 pH at pH = 7***
Accuracy	± 0.05 % O_2 at 0.2 % O_2 ± 0.4 % O_2 at 20.9 % O_2	± 0.1 pH at pH = 7 with one-point adjustment ± 0.2 pH at pH = 7 with pre-calibration
Drift	< 0.01 % O_2 per day (sampling interval of 1 min.)	< 0.01 pH per day (sampling interval of 1 min.)
Measurement temperature range	from + 5 to + 50 °C	
Response time (t_{90})***	at 25 °C: < 60 sec.	
Properties		
Compatibility	Aqueous solutions, ethanol (max. 10 % v/v), methanol (max. 10 % v/v), pH 2 - 10	
Cross-sensitivity	Typically no cross-sensitivity	Reduced to ionic strength (salinity); a high concentration of small fluorescent molecules in the visible range can interfere
Calibration	Pre-calibrated	
	Disposables are delivered irradiated.	

* provided Sensor Flasks are used without further handling in physiological solutions
**HP5 and LG1 sensors require different SFR versions
*** at 100 rpm & in cell culture media

SOFTWARE



PreSens Flask Studio

The SFR vario is delivered with a basic software, which is the control center for the device. The connection between PC and the system inside the shaker is wireless. The software can control up to 4 SFR vario simultaneously. Oxygen, pH and biomass are visualized in real-time during the entire cultivation and running measurements can be compared with former ones. The measurement data can be exported in different file formats (e.g. Microsoft Excel®) for further analysis.

- Enables process monitoring in shake flasks
- Online optical biomass monitoring of microbial culture
- Systematic optimization of cultivation parameters

TECHNICAL

	Minimum System Requirements	Suggested Configuration
Operating system	Microsoft® Windows® Vista™, 7, 8 and 10	Microsoft® Windows® 7 or 10
Processor	1.5 GHz Dual Core	2 GHz Dual Core
RAM	1024 MB	4 GB or more
Hard disk	500 MB free memory	2 GB free memory

GET IN CONTACT

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Rent-a-meter

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