

# Kuhner shaker

## SFR

Determines  
online pH and DO



### The Shake Flask Reader can be integrated with the Kuhner equipment family

SBM/SS-X, LT-X, ISF1-X, ISF4-X

### The SFR - Shake Flask Reader monitors oxygen and pH in up to 9 shake flasks simultaneously



## SFR

The Shake Flask Reader (SFR) from PreSens (Precision Sensing GmbH) is an online measurement device that determines valuable parameters such as dissolved oxygen and pH in shake flasks.

The increasing demand in online techniques for bioprocess monitoring, driven primarily by the initiative of the FDA regarding 'Process Analytical Technology' (PAT), led to the development of the Shake Flask Reader (SFR).

The parameters pH and dissolved oxygen are rudimentary to gaining better process knowledge and control. They are essential for carrying out fast and secure scale up from shake flask to stirred bioreactor.

### Integration with Kuhner incubator shakers

The SFR fits in all Kuhner incubator shakers. It is screwed directly on to any Kuhner universal tray (EU, EXU, FU).

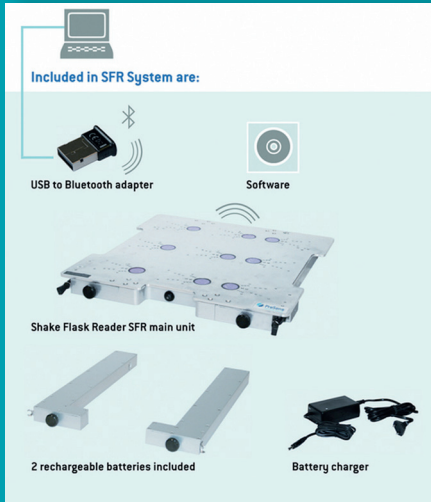
- + Rapid, parallel online monitoring of up to 9 shake flasks
- + For microbial cultivation and cell culture
- + Compatible with Kuhner incubator shakers
- + Non-invasive measurement
- + Optimization of growth conditions

### The smart measurement method

The sensor spots are fixed to the bottom of the shake flasks. The SFR excites the dyes which are embedded in the sensor spots. The resulting luminescence is read by the SFR and this signal is converted to actual pH and DO measurements inside the flask. The luminescence lifetime depends upon the dissolved oxygen concentration and the pH of the sample. The displayed results have been checked against pre-stored calibration data and conversion formulae.

### Shake Flask Reader

includes SFR main unit, software, USB to Bluetooth adapter, battery charger & 2 rechargeable batteries



### Shake flask with sensor spots

for non-invasive online measurement of dissolved oxygen and pH



### Software

The SFRS software from PreSens provides an integrated database to evaluate measurements. These results are displayed in real time during the entire cultivation. The software has a data logging function. The data can be displayed in a variety of graphical formats and can be exported to Excel or as a csv-file for further evaluation. The current measurements can be compared with previously stored cultivation data online. The connection between the SFR and the PC is wireless.

### Oxygen-Sensor

- **Range**  
0-100%
- **Accuracy**  
 $\pm 0.01\% \text{ O}_2$  at  $0.21\% \text{ O}_2$   
 $\pm 0.1\% \text{ O}_2$  at  $20.9\% \text{ O}_2$
- **Drift**  
<  $0.015\% \text{ O}_2$  per day
- **Cross-sensitivity**  
Typically no cross-sensitivity in culture media
- **Temperature range**  
up to  $50^\circ\text{C}$

### pH-Sensor

- **Range**  
pH 5.5 - pH 8.5
- **Accuracy**  
 $\pm 0.05 \text{ pH}$  at pH 7 with one-point calibration  
 $\pm 0.10 \text{ pH}$  at pH 7 with precalibration
- **Drift**  
<  $0.005 \text{ pH}$  per day
- **Cross-sensitivity**  
Reduced to ionic strength (salinity).  
A high concentration of small fluorescent molecules in the visible range can interfere.
- **Temperature range**  
up to  $50^\circ\text{C}$

### Shake Flask Reader

- **Shaker**  
Suitable for all Kuhner Shakers (V/W/X-serie)
  - **Temperature range**  
 $5^\circ\text{C} - 50^\circ\text{C}$
  - **Flask**      **Positions**
- |        |   |
|--------|---|
| 125mL  | 9 |
| 200mL  | 9 |
| 500mL  | 9 |
| 1000mL | 6 |
| 2000mL | 5 |



# Shake Flask Reader

[www.kuhner.com](http://www.kuhner.com)

# Kuhner

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