

RTS-8 Plus, Multi-channel Bioreactor with non-invasive real time cell concentration pH and O₂ measurement

DESCRIPTION

RTS-8 plus is a personal bioreactor that utilizes patented Reverse-Spin® technology that applies non-invasive, mechanically driven, low energy consumption, innovative type of agitation where cell suspension is mixed by the single-use falcon bioreactor tube rotation around its axis with a change of direction of rotation motion resulting in highly efficient mixing and oxygenation for aerobic cultivation. Combined with a near-infrared, fluorescence and luminescence measurement systems, it is possible to register cell growth kinetics, pH and O₂ non-invasively in real time. For pH and O₂, innovative single-use sensor spots are used inside the tubes.

Although O₂ supply is one of the major issues in the cultivation of aerobic organisms, especially in oxygen limited conditions, adequate methods for real monitoring of dissolved oxygen were missing, and sufficient O₂ supply was usually assumed. Innovative non-invasive oxygen sensors integrated in falcon tubes now enable online oxygen monitoring and give new insights into metabolic activities. The pH is one of the major issues in the cultivation of cells, yeast or bacteria. Cultivation vessels which are sensor limited are widely applied in academic and industrial bioprocess development. As adequate methods for real monitoring of pH were not available, cumbersome at-line sampling was used lacking high data density and interfering with growth. Non-invasive real time pH measurement provides new insights into metabolic activity and changes in metabolic pathways.



FEATURES

- Parallel cultivation of 8 tube bioreactors enables to save time and resources for bioprocess optimization
- Individually controlled bioreactor accelerates optimization process
- Possibility to cultivate microaerophilic and obligate anaerobic microorganisms (not strict anaerobic conditions)
- Reverse-Spin® mixing principle enables non-invasive biomass measurement in real time
- Near-infrared optical system makes it possible to register cell growth kinetics
- Free of charge software for storage, demonstration and analysis of data in real time
- Compact design with low profile and small footprint for personal application
- Individual temperature control for bioprocess applications
- Active cooling for rapid temperature control, e.g. for temperature fluctuation experiments
- Task profiling for process automatization
- Cloud data storage to remotely monitor the process of cultivation while at home or using a mobile phone
- Non-invasive O₂ and pH measurement allows for accurate monitoring of metabolic activities

ADVANTAGES OF THE SENSOR SPOTS:

- They are small
- Their signal does not depend on the flow rate of the sample
- They can be physically divided from the measuring system which allows a non-invasive measurement
- They can be used in disposables
- Therefore, they are ideally suited for the examination of small sample volumes, for highly parallelized measurements in disposables, and for biotechnological applications

SOFTWARE FEATURES

- Real-Time cell growth logging
- Real-Time pH and O₂ measurement and logging
- 3D graphical representation of OD or growth rate over time over unit
- Pause option
- Save/Load option

- Report option: PDF and Excel
- Remote monitoring option (requires internet connection)
- Cycling/Profiling options
- User manual calibration possibility for most cells

TYPICAL APPLICATIONS

- Fermentation real time growth kinetics
- Clone candidate screening
- Protein expression
- Temperature stress and fluctuation experiments
- Media screening and optimization
- Growth characterization
- Inhibition and toxicity tests
- Strain quality control
- Initial bioprocess optimization studies

To fully use RTS-8 plus capabilities, the device must be connected to a PC and RTS-8 plus software. The device cannot be used as a standalone unit.

SPECIFICATIONS

Light source	Laser
Measurement wavelength (λ)	850 ± 15 nm
Measurement range	0-100 OD600
E.coli factory calibration measurement range	0-50 OD600
P.pastoris factory calibration measurement range	0-100 OD600
Achievable user calibration measurement error (range 0.1-3 OD600)	± 0.3
Achievable user calibration measurement error (range 3-100 OD600)	≤ 15%
Measurement periodicity per hour	1-60
Temperature setting range	+15°C ... +60°C
Temperature control range	+15 °C below ambient ... +60 °C
Temperature stability	±0.1 °C
Sample temperature accuracy (20°C – 37°C)	±1 °C
Tube sockets	8
Sample working volume range	3–50 ml
Speed control range	50–2700 rpm
Display	LCD
Dimensions (W×D×H)	350 × 690 × 300 mm
Weight	20 kg
Nominal operating voltage	AC 230 V, 50 Hz
Power consumption	3.15 A / 500 W
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O2 sensor	+
Range	0-100%
Accuracy	±0.05% O2 at 0.2%, ±0.4% O2 at 20.9%

Drift	<0.03% O2 within 30 days
Temperature range	up to 40°C
Response time (t90)	<6 s
Storage stability	18 months
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pH sensor	+
Range	4.0 - 8.5 pH
Accuracy	±0.10 pH at pH 7
Drift	<0.005 pH per day
Temperature range	up to 40°C
Response time (t90)	<120 s
Storage stability	18 months