



BE2100 Noninvasive Biomass Monitor

- **Widest linear range** – from <0.1 to >300 OD units – of *any* biomass monitor
- **Automated, continuous, real-time, online OD measurements**
- **Measures through fermentor wall or viewing port** – attaches to *outside* of vessel
- **Works well for both fermentation and cell culture**
- **No immersion port required** – avoids fouling and contamination
- **Lowest total cost of ownership of *any* biomass monitor currently available**
- ***NEW! Improved sensor head design now more durable and spill-resistant***

Noninvasive Biomass Monitor

The BE2100 is an industry-leading, noninvasive biomass monitoring system designed for use in both research laboratory and industrial environments. The sensor head is easily secured to the outside of a variety of different fermentor types, from small glass vessels to large stainless steel vessels with glass viewing ports. Since no immersion port is required, the need for sensor sterilization is also eliminated.

Real-time, Online Monitoring

The BE2100 Biomass Monitoring System consists of a sensor head that attaches to the fermentor, and the base unit that interfaces with the included software, allowing the user intuitive controls and the ability to track the progress of fermentation in real time. The software can calibrate the sensor output to any desired units (OD, g/L, cells/mL, etc.) as well as track important events during the fermentation. The BE2100 base unit comes equipped with serial RS-232, USB and 4-20 mA analog outputs and can function as a stand-alone device or can be controlled through software via RS-232 or USB, enabling straightforward integration into a fermentor control system.



Ultra-Wide Linear Range

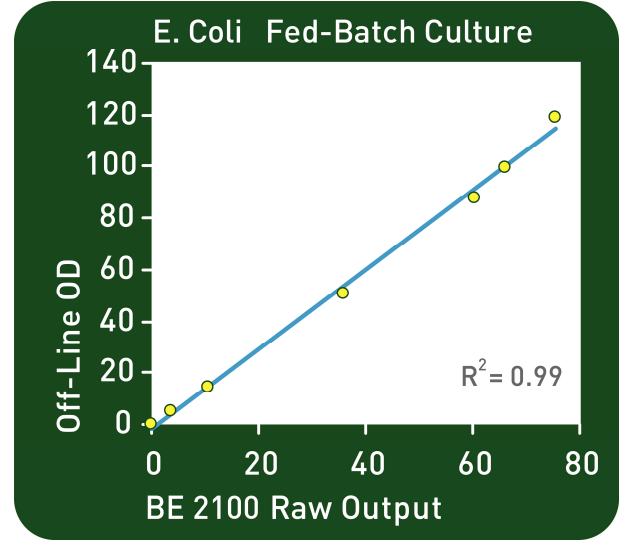
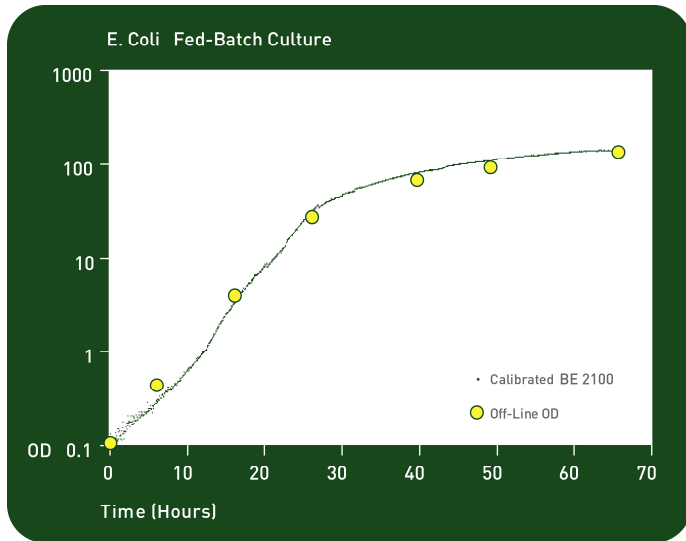
Most immersion probe methods are limited in the range of biomass growth they measure. The BE2100 sensor on the other hand employs a novel method of optical monitoring that responds linearly to biomass over a wide range of growth: from less than 0.1 to greater than 300 OD units.

How it Works

Traditional optical biomass probes rely on a single emitter-detector pair, resulting in a sensitivity to biomass that is highly nonlinear and limited in range. The BE2100 sensor employs an array of infrared lasers and detectors. Each of the laser-detector pairs in the array is sensitive to a different range of biomass changes. The BE2100 advantage is conferred by combining the signals from each of these pairs in a manner that linearizes its response to biomass changes over a very wide dynamic range.



Data Showing Typical BE2100 Performance



Data courtesy of Dr. Tim Davies, Director, Bioexpression and Fermentation Facility, University of Georgia

BE2100 Base Unit and Software Features

Base Unit (Features)

Access to all sensor and base unit settings through interactive keypad
Password control (optional) of keypad access
Lighted display with variable brightness control
Digital (USB and RS-232) and two analog (4-20 mA) outputs

User Interface Software (Features)

Real-time graphical and numerical display of sensor data
Event marking on graph, both pre-defined and user-defined
Baseline setting and subtraction
User calibration of sensor output to any reference units
Access to all sensor and base unit settings

User Interface Software (Requirements)

Windows XP/ Vista Operating System
Available USB or 9-pin RS-232 COM port
Minimum 200 MB free hard disk space



BE2100 Sensor Specifications

Sensor (Performance)

Range of OD Sensitivity	0 to >300 OD units
OD Accuracy	15% (OD 0.5-300)
(typical RMSE in user-calibrated mode)	0.1 OD (OD <0.5)
Averaging Time Constant	30sec-8 min
Performance Verification/Recalibration	calibration cups (2)
Calibration to external reference standards	via user interface software
Sensor communication to base unit	digital

Sensor (Physical)

Front Face Width	15mm (0.59")
Front Face Height	41mm (1.61")
Overall Length (excluding latch)	94mm (3.70")
Active Optical Window (length x width)	25mm (1.0") x 6mm (0.23")
Min. Vessel Diameter	5.3cm (2.1")
Max. Vessel Diameter (std. Strap)	34cm (13.5")
Max. Vessel Diameter (extended Strap)	Unlimited
Max. Window Depth	31mm (1.2")
Functions with Flat Surfaces	Yes
Sensor Cable Length:	
Standard	2m (6')
Extension (Accessory)	4m (13')
Custom extension	up to 15m (50')
External Materials	
Body	Aluminum
Gasket	PVC
Filter	Acrylic
Strap	Nylon
Latch	Stainless Steel
Fasteners	Stainless Steel
Cable, Strain Relief	Polyurethane

Sensor (Environmental and Safety)

Operating Temperature	0 to 50°C (30 to 120F)
Environmental Seals	Yes – Splash Proof
Laser Product Classification	1M



BE2100 Base Unit Specifications

Base Unit (Electrical)

DC Power In	9V, 1A
Analog Output:	4-20 mA (500Ω Max.)
Resolution	12 bit (0.004 mA)
Number of Range Settings	3
Number of Outputs	2
Digital Output	RS-232/DB9 and USB
Communications Cable (optional):	
Wiring	RS-232 and USB
Connectors	DB9 (M/F) and USB
Length	
Standard	2m (6')
Custom	up to 15m (50')

Base Unit (Physical)

Overall Width	15.6cm (6.2")
Overall Length (without connectors)	12.7cm (5")
Overall Height (without feet)	7.9cm (3.1")

Base Unit (Environmental)

Operating Temperature	0 to 40°C (30 to 100F)
Operating Environment	dry location use only

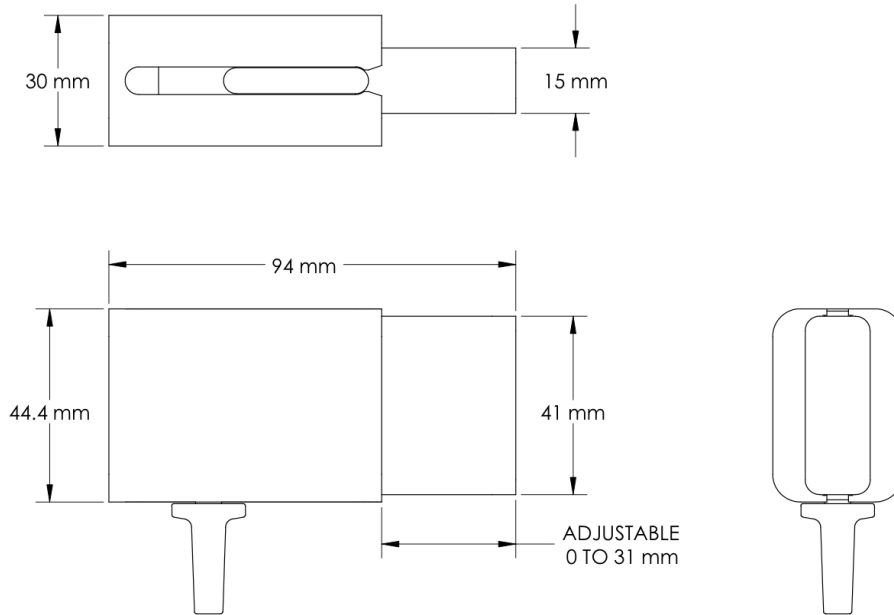
Calibration Cup (Physical)

Width	30mm (1.2")
Height	45mm (1.8")
Length	
Low range cup	43mm (1.7")
High range cup	70mm (2.8")
External Material	Black polycarbonate





BE2100 Sensor Head Dimensions



BE2100 Base Unit Dimensions

