Sterilizable Sensors

TruCell2

Features

- Low cost solution
- Remote transmitter
- Interchangeable probes
- Calibration and diagnostic features
- Validation kit for cGMP applications

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TruCell2 Sensor

The TruCell®2 sensor is a near-infrared light absorption sensor that comprises a sensor probe, selectable from a variety of configurations, a cable, and a transmitter. The transmitter integrates the signal processing, power con-version, 4-20 mA output signal generation, and user interface functions in one package.

TruCell2 Transmitter and probe

This figure illustrates the major components of the TruCell2 sensor. The probe is connected to the transmitter using a cable, which has one termination inside the transmitter and the other termination is a hooded connector that attaches to the probe.

TruCell2 Probe

The sensor probe employs a FDA-approved PFA® sensor head with possible alternative optical path lengths (OPL) of 5.0 mm (fermentation) or 10.0 mm (cell culture). The fluid inside the reactor, vessel or process piping passes into this gap. The FDA-approved PFA® used in the sensor head is transparent to near infrared light, allowing the FDA-approved PFA® surfaces to serve as the transmission windows. The system utilizes a laser as the near infrared light source.

The sensor probe includes the main shaft, the sensor head, and the electrical connector that is connected to the transmitter using a cable (6 ft [1.83 m] or 10 ft long [3.05 m]). For a given transmitter, the sensor probe can be replaced. The sensor probe can be separated from the cable and transmitter for sterilization.

TruCell2 Transmitter

The TruCell2 Transmitter look and feel was based on our family of pH and dissolved oxygen (DO) transmitters for life science applications. The TruCell2 Transmitter has a rugged, weatherproof, corrosion resistant enclosure (NEMA 4X). The panel mount version fits standard ½ DIN panel cutouts, and its shallow depth is ideally suited for easy mounting in cabinet-type enclosures. A pipe mounting accessory kit is available for mounting to a 2-inch pipe.

There are two levels of access (operator and technician). The access level setting determines whether both, neither, or only the technician level require using a password to log into the transmitter. Only the technician level has access to setup menus.

The transmitter offers automatic recognition of up to twelve (12) TruCell2 probes, and stores the initial calibration data for each probe. Diagnostics such as the “laser test” or “probe health test” warn the user of an aging or failed TruCell2 probe.

All transmitter and probe configuration settings are recovered automatically from non-volatile EEPROM when power is restored after a power failure.

TruCell2 Cable

The TruCell®2 probe and transmitter are connected together using a pre-assembled electrical cable, which can be either 6 ft or 10 ft in length. The wire is 29-AWG and shielded, in order to optimize the signal-to-noise ratio at the transmitter electronics.

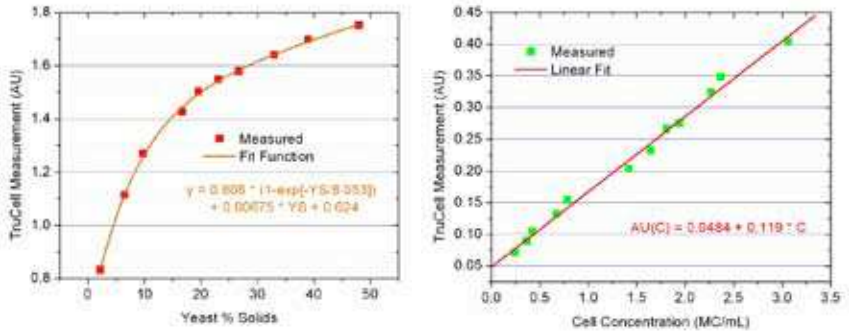
The cable connects to the probe using a “snap-on” Fischer connector to prevent unwanted connection failures. A cable boot is provided on the probe shaft side to protect the electrical leads in a wash-down environment. An 8-pin DIN connector is used to connect the cable to the main transmitter electronics board. A cable gland is provided on the cable as well, that fits into the one of the transmitter openings, and assures a NEMA 4X rated seal.

TruCell2 cable

TruCell2 Curve Fit Applet

For biological samples, especially those related to fermentation, there can be a very high degree of non-linearity owing to light scattering. Fermentation applications often produce a curve that saturates exponentially, when increasing forward scattering of the light saturates the photo-detector response. Cell culture applications can either be linear, or saturate like the fermentation response. Care must be taken to position the TruCell2 sensor away from the sparger, as bubbles will produce additional scattering losses that are not correlated with cell density, and thereby disrupt the measurement.

Finesse has developed a curve fitting algorithm that can convert the measured optical loss into process units.



Response of TruCell AU versus (left) yeast % solids and (right) CHO cell concentration

The Finesse “TruCell Conversion” program generates the parameters for a non-linear curve fit, so that the TruCell2 transmitter can directly convert raw AU data into user-defined process units. By doing this in real-time, the user can generate meaningful process data for controlling the process. For example, the conversion program can be used to convert from raw AU to cell density (cells/l), optical density (OD), or dry cell weight (g/l).

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