FluorLite-LX™ Sensor

Measures "True" Protein in Dairy Permeates

- Measures "True" protein between 0.005 and 0.30%
- Does not measure NPN (Non-Protein Nitrogen)
- Automatically corrects for solids to 10%
- Outputs a signal linearly proportional to protein concentration
- No plant calibrations needed
- Real-time in line sensor

Technology

The FluorLite-LX measures "true" protein in dairy permeates by using tryptophan fluorescence as a tracer for protein. UV light at 280 nm is used to excite tryptophan with the resulting fluorescence at 350 nm measured. The result is a sensor with high sensitivity at low protein concentrations. An additional feature of the sensor is that it measures "true" protein because non-protein nitrogen (NPN) does not fluoresce. These unique features provide a sensor that measures "true" protein and provides a precise and economically valuable measure of membrane filter performance. The measured protein concentration information can be used to monitor membrane performance, provide a threshold alert for excess leakage, and facilitate membrane replacement decisions.

Measurement Range

The true protein concentration of a dairy permeate solutions is generally desired to be less than 0.05% and many plants operate at around 0.02%. The FluorLite-LX easily operates down to 0.005%. The FluorLite-LX sensor can be calibrated at the factory up to 0.30% protein.

Solids Correction

A unique optical design corrects the measured signal for solids concentration. The typical range for soluble solids concentration in dairy permeate varies from 1 to over 10% depending on the filtration process. As dairy permeate solids increase, the measured fluorescence decreases because the solids absorb and scatter the fluorescent light. This effect is called light extinction and results from a combination of absorption, scattering, and quenching of the light. The FluorLite-LX sensor is calibrated to automatically correct the measurement for solids concentration up to 10%.

Output Signal

Firmware algorithms correct the measurement for temperature and reduce effect of air bubbles in the process stream. The output is a 4-20 mA signal linearly proportional to true protein.

FluorLite-LX™ Technical Specifications

Calibration and Performance

The FluorLite-LX is factory-calibrated using appropriate dry permeate and WPI samples. An array of samples that have the protein and solids concentration of interest are prepared and the fluorescence measured. Figure 1 shows the results of a calibration. A calibration algorithm is developed for the specific sensor and samples of interest. No calibration is needed at the dairy plant. A typical measured response of true protein for operation over 18 hours is shown in Figure 2.

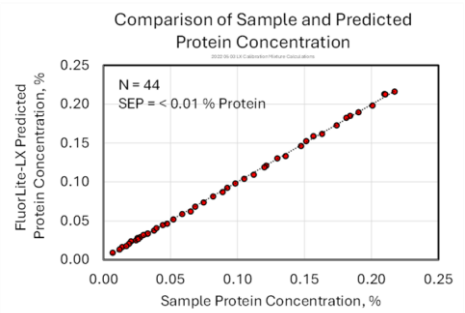

Fig. 1. "True" protein in dairy permeate with varying protein and solids concentrations.

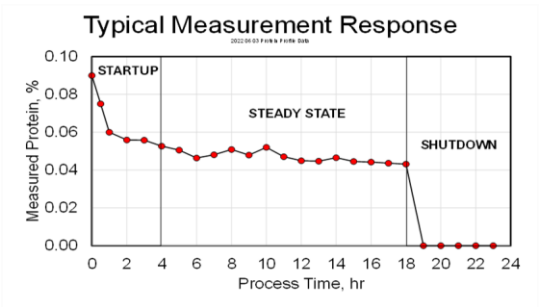

Fig. 2. A 24-hr sensor in dairy processing.

Installation

The FluorLite-LX sensor is installed in a direction that provides continuous contact with the liquid product as well as drainage after a cleaning operation. The cable connection is on the bottom of the sensor. It is recommended that the FluorLite-LX sensor be installed into the short leg of a vertical tee as shown in Figure 3.

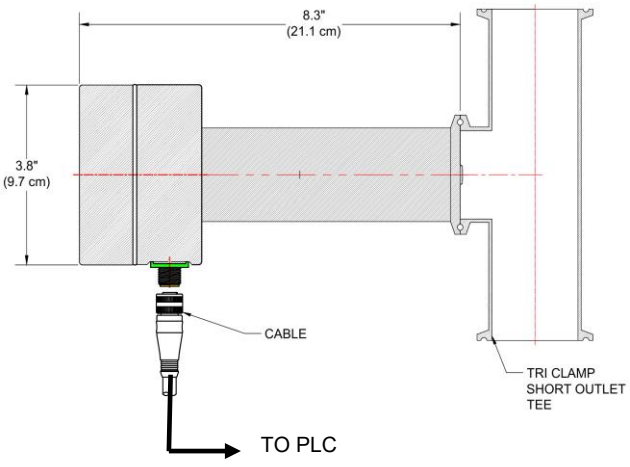

Fig. 3. FluorLite-LX sensor dimensions and suggested installation orientation.

FluorLite-LX sensor

reflectronics.com/products