In-line dissolved oxygen measurement in bright (finished) beer using the ORBISPHERE M1100 Luminescent Dissolved Oxygen Sensor

- Continuous measurement gives real time results for improved process monitoring
- Sensors are fully compatible with normal CIP routines
- M1100 benefits include a single annual maintenance and an annual calibration
- Accurate to ±0.8 ppb for confidence at low oxygen levels with measurement every 2 seconds to quickly detect process changes.
- Dry sensor with no membrane eliminates the pressure effects associated with traditional electrochemical sensors

Application description

After fermentation, rough (green) beer containing less than 10 ppb of dissolved oxygen is transferred to conditioning (aging) tanks. This allows the yeast to separate from the beer under the influence of gravity. Following aging, the beer is centrifuged, filtered, and blended before transfer to bright beer tanks. During this processing, the brewer must make every effort to exclude air, which can cause distinctive off flavors and reduced shelf life in the finished product.

Sources of air in-leakage can include leaking pump glands, worn seals, empty filter aid dosing tanks, and transfer lines and tanks not cleared of air. Older centrifuges can allow air ingress with bowl discharge if not sealed or inerted properly. Filter aid dosing pumps will inject air if the tanks inadvertently run dry. Blending water, used in high gravity brewing, must be maintained at low dissolved oxygen (DO_2) concentrations to avoid an overall DO_2 increase in the bright beer.

Dissolved oxygen sensors installed in-line after the centrifuge and filter, and before the filler will provide the brewer with a base level of DO_2 measurement coverage. However, depending upon air in-leakage concerns, sensors can be installed at virtually any point in the process.

Installation recommendations

The ORBISPHERE 28mm sensors can be installed via a simple sensor socket, model 29501, which is welded to the process piping, or via a ProAcc™ valve, model 32003, which allows the sensor to be installed or removed while the line is running. Both fittings should be installed so that the sensors are horizontal. It is also possible to install the ORBISPHERE 12mm sensor in an existing 12mm socket to simplify retrofits.

The preferred sensor location is in a horizontal pipe, although a rising main is acceptable. Falling mains are to be avoided due to the possibility of reduced pressures resulting in foaming. As the ORBISPHERE M1100 is a dry sensor with no membrane or electrolyte, measurements remain independent of hydrostatic pressure shocks or other

large variations in flow. The ORBISPHERE M1100 is also not subject to sample flow changes hence offers more reliable measurement during production line startup, shutdown, or throughput variations (associated with tank switching).

Recommended systems components

Model	Description
410M/W1C00000 or 410M/P1C00000	Orbisphere 410 dissolved oxygen (optical) instrument, wall mount, 85-264 VAC, 0/4-20mA analog output, RS485
	Orbisphere 410 dissolved oxygen (optical) instrument, panel mount, 85-264 VAC, 0/4-20mA analog output, RS485
M1100-S00	Luminescent dissolved oxygen sensor for in-line applications, 0-2000 ppb, with 28mm ORBISPHERE fitting
32510.05	Sensor cable (5m) to connect M1100 type sensor with ORBISPHERE 410/510 instruments
32003	Sensor insertion and retraction valve for mounting on Tuchenhagen Varivent® in-line access unit