



EXCELLENCE IN PROCESS ANALYTICS

Application Note

Beverage No. 01

In-line dissolved oxygen measurement in bright (finished) beer

- Continuous measurement gives real time results for improved problem detection
- Sensors are fully compatible with normal CIP routines
- Direct sensor installation avoids by-pass delays and reduces threat of microbiological contamination
- Accurate to ± 2 ppb for confidence at low oxygen levels

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

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.

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. If possible, sensors should be installed at least 10 meters from the outlet of a pump or centrifuge and at least 3 meters from the inlet in order to avoid hydrostatic pressure shocks. To assure uniform sample flow, sensors should be installed at least six pipe diameters from valves or other piping intrusions.

Recommended systems components

Model	Description
410/A/P1C00000 or 410/A/W1C00000	Orbisphere 410 oxygen (EC) instrument, panel mount, 85-264 VAC, 0/4-20mA analog output, RS485
	Orbisphere 410 oxygen (EC) instrument, wall mount, 85-264 VAC, 0/4-20mA analog output, RS485
A1100-S00	Electro-Chemical oxygen sensor, Stainless Steel, Maximum pressure 100 bar, with Smart capability
2952A-A	Recharge kit of 4 pre-filled cartridges with premounted 2952A membranes for A1xxx oxygen sensors. Includes o-rings, cotton filters and cleaning tools
33051-SG	Stainless steel 28mm cap with grille for ORBISPHERE A1100 family EC sensors. For use in beer or soft-drinks processes.
32501.03	10 wire cable to connect 31xxx sensors to Orbisphere 410/510 wall and panel instrument, length 3m (longer lengths available)
29501.0 or 32003	Stainless steel sensor socket with EPDM O-rings for welding to stainless steel pipe.
	Sensor insertion and retraction valve for use with Tuchenhausen adapter.

Additional systems

The multi-channel 510 series analyzers are also available, allowing measurement of carbon dioxide (with TC sensors) in addition to oxygen as described above.

Model	Description
510/AD0/P1C00000 or 510/AD0/W1C00000	Orbisphere 510 oxygen (EC) and carbon dioxide (TC) instrument, panel mount, 90-240 VAC, 0/4-20mA analog output, RS485
	Orbisphere 510 oxygen (EC) and carbon dioxide (TC) instrument, wall mount, 90-240 VAC, 0/4-20mA analog output, RS485