

High quality sake thanks to VisiFerm DO Arc

Water de-aeration controlled by the VisiFerm DO Arc helps to standardize the Japanese national drink

Industry: Alcoholic beverages

Application: controlling and adjusting de-aerated water

Hamilton product: VisiFerm DO Arc



Sake is Japan's famous and very traditional alcoholic beverage made of rice. It's produced by means of a brewing process that is almost similar to beer.

Sugar first has to be converted from starch to enable the yeast to produce alcohol. Unlike beer the starch will be degraded by *Aspergillus oryzae* because rice for sake doesn't contain the enzyme amylase. Like for all foodstuffs the culinary delight of sake depends amongst others on the amount of oxygen present because it affects the flavor, the color and the taste adversely. Japanese sake breweries pay attention to the amount of dissolved oxygen (DO) in order to produce delicious and high quality sake. Therefore the oxygen will be removed from the unprocessed sake (approx. 18-20 % ABV) by either purging with nitrogen or applying membrane technology. Fujisaki Industrial Company has implemented a hollow fiber membrane technology because it reduces the running costs. After the filtration the alcohol content will be adjusted with de-aerated water at about 15 % ABV. Prior to bottling the sake will be stored in a tank again.

Improvements due to optical DO sensor

The VisiFerm DO Arc is used after the membrane to check if the content of dissolved oxygen is at its optimum between 1 and 2 ppm. So far Fujisaki Industrial Company had used conventional, amperometric DO sensors. Now they have implemented Hamilton's optical sensor VisiFerm DO Arc. There are different reasons why Fujisaki decided to change the measuring principle: no need to worry about hairline



Figure 1: DO (Membrane degasifier) used in sake production.

cracks in the membrane and the loss of electrolyte because the VisiFerm DO Arc is an optical sensor without any electrolyte; maintenance is very easy because the only part that has to be changed from time to time is the cap and polarization isn't necessary; the size of the VisiFerm DO Arc is smaller and can be easier installed in the de-aeration unit; the data can be sent to a laptop computer or directly to the process control system via the 4-20 mA output without any further transmitter. All these benefits help Fujisaki to offer the sake breweries reliable, low maintenance and cost-efficient de-aeration equipment for high quality sake.

Acknowledgement

We would like to thank Dr. Enda from Fujisaki Industrial Co. for his support and for providing the process data sets presented in this Application Note.

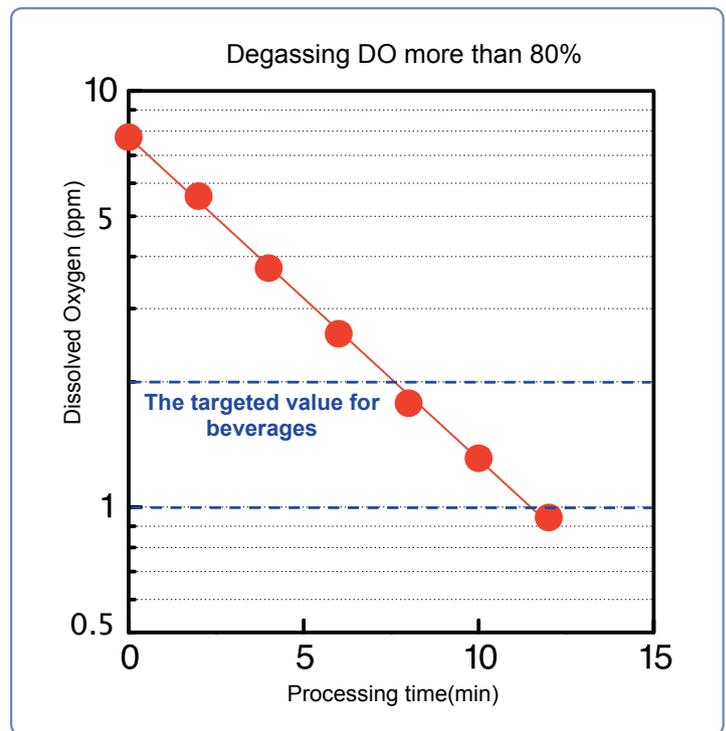


Figure 2: Logarithmic graph of DO measurements during de-aeration. The target for de-aerated water is 1-2 ppm DO.

Technical data VisiFerm DO Arc

Measuring range	4 ppb to 25 ppm (DO) or 0,1 to 600 mbar (pO ₂)
Response time t98%	< 30 s at 25 °C, from air to nitrogen
Oxygen consumption	None
Required flow	None
Operating temperature	-10 to 140 °C; the sensor provides no DO reading above 85 °C
Pressure range	0 to 12 bar
Measurement principle	Oxygen dependent luminescence
Medium contacted materials	Stainless steel 316L/DIN 1.4435 FDA approved silicone and EPDM
Surface quality of steel	Ra < 0.4 µm (N5)
Interface	Configurable 4-20 mA interface (DO or Temperature), digital RS485 Modbus RTU interface
CIP/SIP	Yes

Author:

Yusuke Sugawara
Sales Engineering Division V
T & C Technical Co., Ltd.
40-12 Senju-Nakacho Adachi-ku
Tokyo 120-0036, Japan
www.tactec.co.jp



Customer:

Dr. Enda
Fujisaki Company Ltd.
2419-64, Yurigaoka 1, Moriya-shi
Ibaraki 302-0110, Japan
www2.ocn.ne.jp/~fjsk/index.html



© 2013 Hamilton Bonaduz AG. All rights reserved.
P/N: 695162/00 — 11/2013

HAMILTON®

Web: www.hamiltoncompany.com
USA: 800-648-5950
Europe: +41-81-660-60-60

Hamilton Americas & Pacific Rim
4970 Energy Way
Reno, Nevada 89502 USA
Tel: +1-775-858-3000
Fax: +1-775-856-7259
sales@hamiltoncompany.com

Hamilton Europe, Asia, & Africa
Via Crusch 8
CH-7402 Bonaduz, Switzerland
Tel: +41-81-660-60-60
Fax: +41-81-660-60-70
contact@hamilton.ch

To find a representative in your area, please visit hamiltoncompany.com/contacts.