

Increase Dissolved Oxygen levels in lakes with MPC-NanoBubble

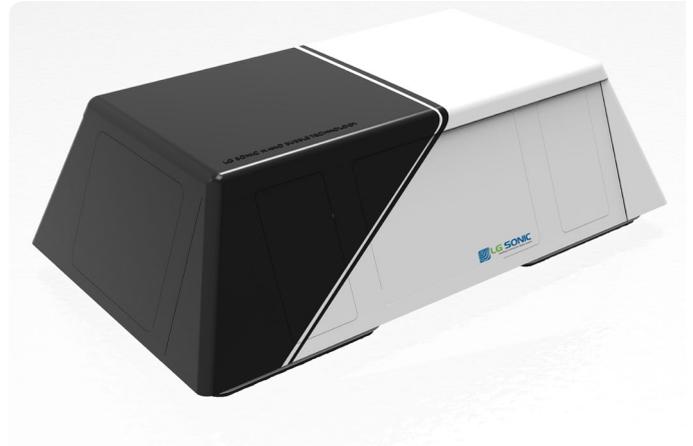
- ✔ Oxygen remains in the water up to 2 months
- ✔ Reduce release of nutrients, and other components from the sediment
- ✔ Low total power consumption

Autonomous Nanobubble Solution

Effects of low oxygen concentrations in a water column may include the release of nutrients and other potentially harmful molecules from the sediment, such as manganese or heavy metals.

MPC-NanoBubble

Until now, Aeration technologies use macro-bubbles to increase oxygen levels. However, due to their buoyancy, these ascents rapidly to the water surface, allowing for little oxygen diffusion into the water column and therefore high energy consumption. The MPC-NanoBubble is an energy efficient system to increase oxygen in the lake. The system offers an autonomous, environmentally friendly solution to oxygenate even large water surfaces such as lakes and dams.



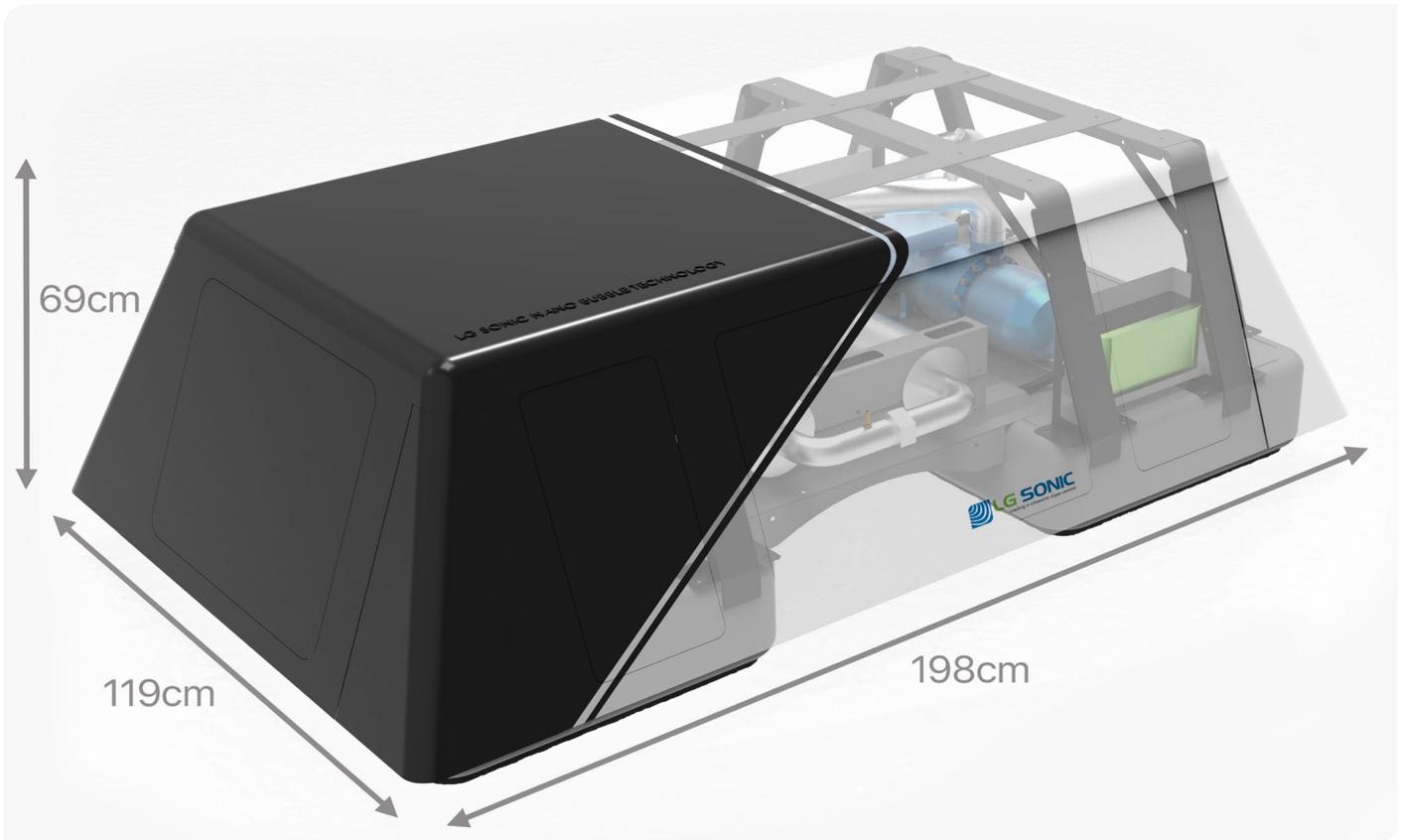
Technology benefits

- ✔ **Nanobubbles do not rise to the water surface**
Nanobubbles remain in the water until they have been used entirely. No bubbles rise to the water surface, therefore it can be said that the nanobubble technology is the most efficient technology to transfer any gas into a liquid. Nanobubbles are known to remain in the water column for 3 weeks up to even 2 months.
- ✔ **MPC-Nanobubble uses pure oxygen as a source**
To make the transfer of oxygen into the water more efficient, LG Sonic uses pure oxygen gas as a source. Using pure oxygen instead of air as a source for the nanobubble technology, can increase the efficiency of the device up to 5 times. The use of pure oxygen allows the Nanobubble system to locally increase oxygen levels to over 60 mg/L
- ✔ **Autonomous application**
The MPC-NanoBubble is the only system in the world that moves autonomously through a waterbody to oxygenate a lake in its entirety. Because nanobubbles can remain in the water for weeks to months, a static installation is not necessary for this technology. Instead, the MPC-Nanobubble has been designed to move through a lake increasing the dissolved oxygen levels based on real-time water quality measurements.

MPC-NanoBubble is an energy efficient system to increase oxygen in the lake

How it Works

The MPC-NanoBubble increases oxygen concentrations over the entire waterbody autonomously ensuring an efficient, sustainable and effortless treatment.



1. Moves freely around its mooring point

The MPC-Nanobubble is moored to an anchor within the lake, allowing free movement around the mooring point. From there, the system automatically moves through waterbody, steadily increasing oxygen levels.

2. Realtime Oxygen Monitoring

The MPC-Nanobubble includes real time sensors for dissolved oxygen levels. The collected data is delivered in real time via radio, GPRS, or 3G to web-based software.

3. Autonomously moves to next location

Once the oxygen levels are back to desired levels, the system automatically moves on to treat another section of the lake, by extending the mooring line.

The first autonomous mobile solution to increase Dissolved Oxygen levels interactively

Increase Dissolved Oxygen levels in large water surfaces

MPC-NanoBubble has been specially designed to increase dissolved oxygen levels in large water surfaces.

Drinking Water Reservoirs



Irrigation Reservoirs



Lakes



Industrial Reservoirs



Real-time Water Quality Monitoring Software

MPC-View is an advanced web-based software. The software allows to generate a complete overview of the water quality of one or multiple water bodies.

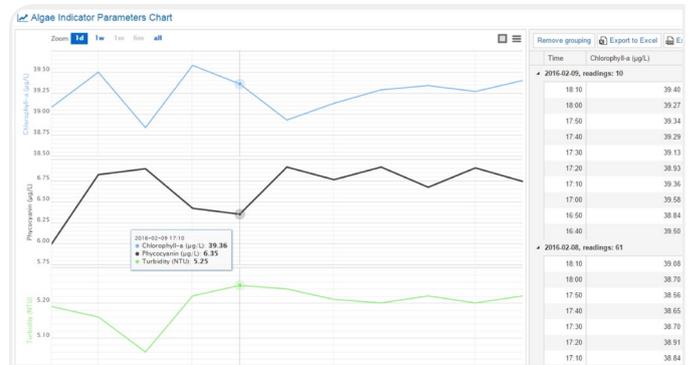
- ✔ Real-time insight in the water quality
- ✔ Data transfer through radio, GPRS, 3G
- ✔ Ultrasonic program changes based on received water quality data



Insights into the Water Quality



- ✔ The software receives, summarizes, and publishes data into charts, tables, and spreadsheets on your personal webpage
- ✔ Allows users to follow the progress of the algae treatment and the status of the units



- ✔ Based on the data, ecologists, biologists and technicians from LG Sonic modify the ultrasonic program for effective treatment
- ✔ Set alarms for changing water conditions and maintenance activities

User-friendly software to real-time monitor the water quality

Data Driven Water Treatment



LG Sonic combines water quality data and ultrasound technology to provide a complete algae solution for large water surfaces. LG Sonic has been gathering water quality information for many years in different water bodies all over the world. This has resulted in a database, containing different algal species, water quality characteristics and applications in relation to the most optimal ultrasonic treatment program.

Technical Specifications

Nanobubble generator specification

Capacity (water flow rate)	• 10 m ³ / hr
Gas usage	• Pure Oxygen/ air/ Ozone, etc.
Dissolved Oxygen concentration	• 50 ~80%
Power consumption	• 2 ~ 5 kWh

Floating pontoon specification

Aluminum framed polyethylene buoy	• Rotationally-moulded UV-stabilized HDPE polyethylene
Buoy filling	• Closed-cell polyurethane foam
Buoy frame	• Anodized aluminum
Buoyancy capacity	• Flexible 800 – 2000 Kg, depending on configuration
Power provision	• Generator/ 14 kWh battery pack

Water Quality Sensor Package

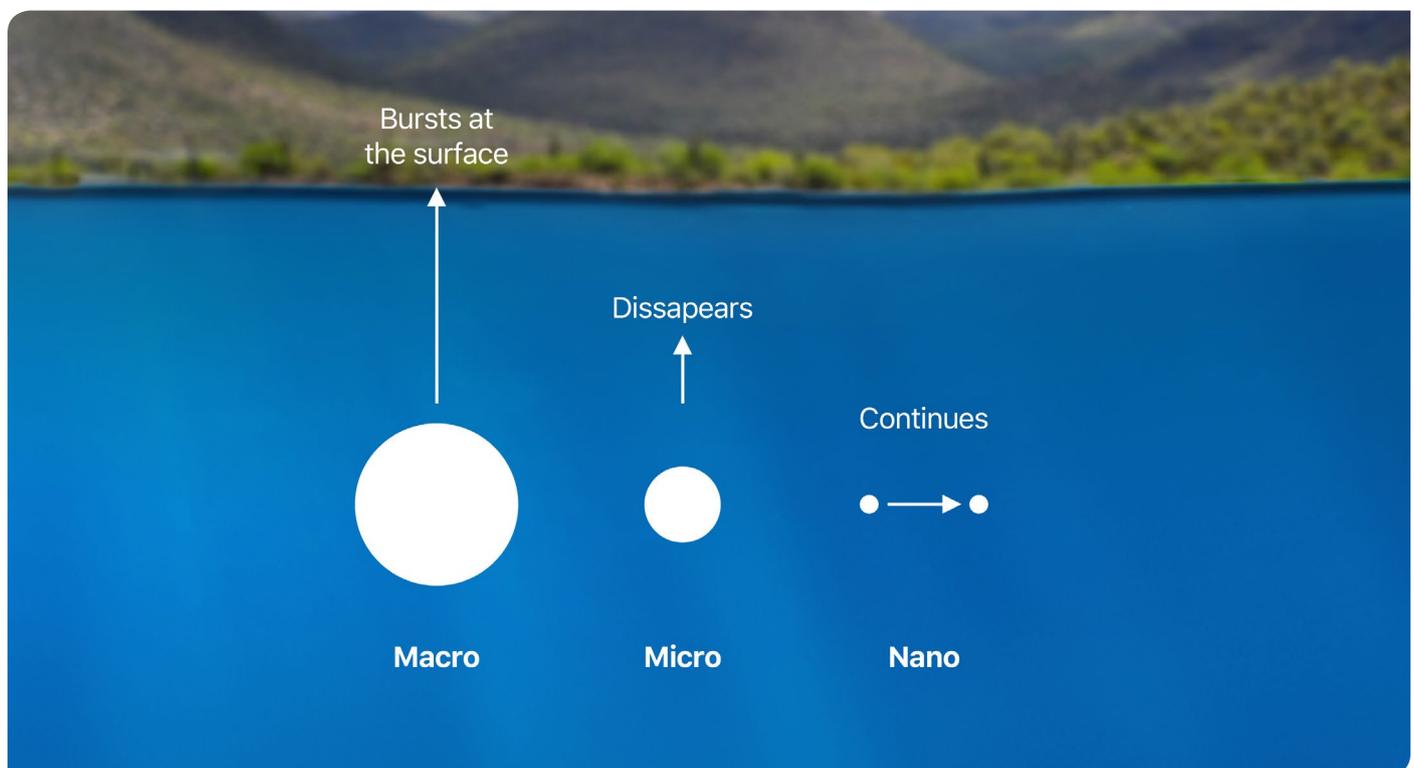
<p>Redox</p> <ul style="list-style-type: none"> • Combined electrode (Redox/reference): • Platinum tip, Ag/AgCl • AgAgCl. • Gelled reference (KCl) • Range - 1000 to + 1000 mV • Resolution 0,1 mV • Accuracy ± 2 mV 	<p>pH</p> <ul style="list-style-type: none"> • Combined electrode • (pH/ref): • special glass, Ag/AgCl ref. • Gelled electrolyte (KCl) • Range 0 – 14 pH • Resolution 0,01 pH • Accuracy +/- 0,1 pH
<p>Dissolved Oxygen</p> <ul style="list-style-type: none"> • Optical measure by luminescence • Measure ranges: • 0.00 to 20.00 mg/L • 0.00 to 20.00 ppm • 0-200% 	<p>Temperature</p> <ul style="list-style-type: none"> • Technology CTN • Range 0.00 °C à + 50.00°C • Resolution 0,01 °C • Accuracy ± 0,5 °C • Response time < 5 s

Why use Nanobubbles?

Anoxic conditions in lakes can be caused by a number of factors, such as stratification (in deep lakes), algal blooms and high water temperatures. Once oxygen levels in the water become too low, the lake's ecosystem will be affected. Direct effects of anoxia in a lake may include release of organic and inorganic molecules, such as nutrients, metals and manganese and a decreased growth of aerobic bacteria in the hypolimnion

Phosphorous release from the sediment provokes algal blooms and leads to eutrophication of lakes and water bodies. In water bodies where algal blooms have caused the anoxic conditions of the hypolimnion in the first place, algal problems will escalate even further when this occurs. Because algal blooms may also increase pH levels, growth of other (competing) organisms in the water will decline, allowing the algae to consume most of the nutrients that are being released from the sediment.

Heavy metal release of the sediment may lead to alternative problems, such as the degradation of the ecosystem and potential toxicity and harm to domestic animals or humans using the water recreationally.



When the water is being used for the production of drinking water, the release of inorganic compounds such as Hydrogen Sulfide, manganese and Ammonium may also affect the treatment process and reduce the quality of the final product.

It is therefore important, for the correct treatment of a lake or waterbody that anoxic conditions in a lake are being improved. This can be done through various methods, but the most efficient method would be the application of Interactive Nano bubble systems.



Over 10,000 LG Sonic algae control products have been successfully installed in a wide range of applications in 52 different countries

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