THE INVENT ALPHAMETER®

Traditionally, aeration system control and monitoring has always been based on liquid phase measurement of parameters related to aeration system performance. Many of these parameters have been used as indicators of biological process and aeration system performance, but none have been able to provide accurate, real time measurements of process oxygen demands and aeration equipment performance.

A new age in aeration process control and monitoring

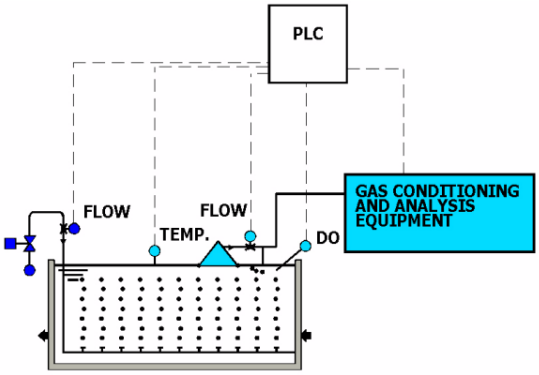
The **ALPHAMETER**® combines liquid and gas phase measurements to develop real time measurement of key parameters for biological process and aeration control including:

- Aeration System Oxygen Transfer Efficiency (OTE)
- Process Oxygen Uptake Rate (OUR)
- Mixed Liquor α Value

ALPHAMETER® - with Off-gas collection hood

Accurate knowledge of these parameters allows a new approach to understanding and controlling both the biological process and aeration system performance.

The **ALPHAMETER**® opens the door to a new world in aeration system control resulting in improved process control and substantial energy savings.



ALPHAMETER® - Functional diagram

PRINCIPLE

The **ALPHAMETER**® combines liquid phase measurements of parameters such as mixed liquor DO[1] or temperature with gas phase measurements of the composition of the gas leaving the aeration basin surface (Off-gas).

The relative difference in oxygen content of the gas entering the tank and the Off-gas leaving the tank surface allows measurement of the oxygen transfer efficiency of the aeration system.

This data is processed in the **ALPHAMETER**® PLC and combined with aeration system clean water performance data, system operating conditions and site ambient conditions to determine biological process OUR and mixed liquor oxygen transfer characteristics (α value).

MONITORING

The **ALPHAMETER**® is a useful tool for the monitoring of both biological process and the aeration system performance.

[1] DO: Dissolved Oxygen

The best aeration control system

The ability to develop real time OUR[2] data allows quantifying diurnal/seasonal variation in process loadings and demands, detecting process inhibitions and providing vital information on plant bottlenecks or process unbalances.

Real time measurement of aeration system performance parameters such as Oxygen Transfer Efficiency and α provides valuable information on diurnal/seasonal changes in aeration system oxygen transfer capacity, aeration system long term performance, maintenance and service requirements and oxygen transfer inhibition episodes. In many cases, this information is key to understanding treatment plant overall oxygen transfer and treatment capacity as well as improving conventional control system tuning and performance.

ALPHAMETER® - Off-gas collection hood on site

CONTROL

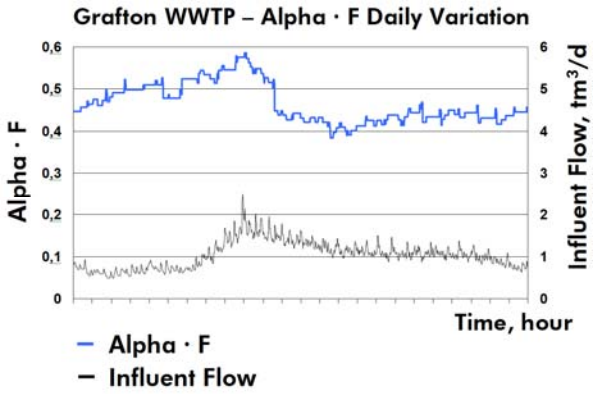
Real time measurement of process oxygen demand (OUR) and parameters affecting oxygen transfer (α), the **ALPHAMETER®** allows a quantitative approach to aeration system control.

Combined knowledge of the amount of oxygen required to fulfill process needs and all parameters affecting oxygen transfer allows the **ALPHAMETER®** to determine the exact amount of air required to meet both biological process and operator control needs eliminating all trial & error, iterative (PI, PID, etc.) and tuning based control algorithms.

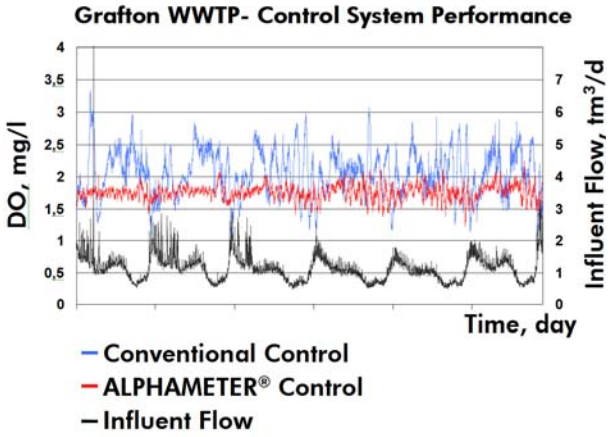
This direct approach greatly reduces aeration control response time allowing more accurate control resulting in increased system stability and significant energy savings.

COMMUNICATIONS

The **ALPHAMETER®** offers a wide range of communications options including hard-wired Analog I/Os, Ethernet communications compatible with most PLC brands and Profibus, Profinet and Modbus configurations. These comprehensive features allow easy communication with plant information networks or use of **ALPHAMETER®** data by existing or new control systems.



ALPHAMETER® - Real plant data: Alpha·F daily variation



ALPHAMETER® - Real plant data: side-by-side control system performance

ALPHAMETER® is an innovative product sold and manufactured by **INVENT** Aeration Services S.r.l., Italy. License and patents by A2C, USA

[2] OUR: Oxygen Uptake Rate

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