Application Report
Dissolved Oxygen in Raw Water / Treated Water

SIGRIST PROCESS-PHOTOMETER

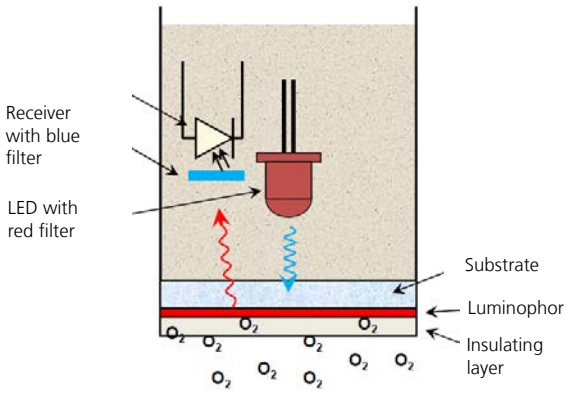
Dissolved oxygen (DO) is an indicator of the quality of water. The value shows how much oxygen is free in the water, i.e. available for any living being. Solubility of oxygen depends on pressure and temperature.
What the oxygen sensors actually measure is the partial pressure of oxygen (pO_2). The measuring signal is subsequently converted into the displayed value in mg/l or ppm O_2 while temperature and the maximum concentration of the saturated water is taken into consideration.
In the European Union, the threshold value for O_2 in drinking water is defined at a minimum of 5 mg/l.

How to measure O_2

There are two principally different kinds of oxygen measurements:

- amperometric
- luminescence (fluorescent quenching)

For measuring luminescence, the sensor is immersed in the medium to be measured. At the tip there is an insulating layer and an oxygen permeable layer, called luminophore. At its inside, this layer is separated from the optics by a light permeable substrate. Luminophore contains molecules which emit red light (fluoresce) when stimulated by blue light.



Picture 1: Principle of measuring luminescence, sensor tip

Oxygen molecules which combine with luminophore absorb blue light. This reduces the fluorescence. This fluorescence decay is termed "quenching" and correlates in intensity and duration with the partial pressure of oxygen.
Technically speaking, the phase shift between excited light and emitted light is measured. This phase shift is proportional to the concentration of O_2 in the medium and does not depend on the amplitude of the fluorescent light. From this, the concentration of the dissolved oxygen present is determined in mg/l or ppm.

The content of oxygen is dependent on temperature which is why temperature is simultaneously measured by the Hamilton sensor and included in the calculation.

Benefit of the O_2 measurement

In the case of raw water, oxygen measurement serves as a parameter for determining further process steps such as, for example, aeration of the water.
In treated water, it is desirable to know this value in order to keep predetermined values.

The sensor VISIFERM DO ARC 120

The sensor used in the AquaMaster is part of Hamilton's ARC programme. In the upper portion of the sensor, the data is digitalized. All necessary operating activities can be carried out via the AquaScat.

Picture 2: Hamilton VISIFERM DO ARC 120

The sensor provides values for O_2 concentration and temperature.

Product

SIGRIST product and configuration:

- Hamilton VISIFERM DO ARC 120

Parameter settings

- The sensor is calibrated and ready to use upon delivery

Advantages of the Hamilton sensor
» Customer benefits

- The ARC concept allows permanent quality monitoring of the sensor
  » A warning is given if the tip of the sensor needs to be replaced
- The sensors are preconfigured
  » Replacement is very simple
  » Retrofitting is very simple