

## CONSIDERATIONS ON WATER TREATMENT USING OPTICAL SENSORS LDO

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This paper presents solutions to reduce energy consumption in water treatment plants using optical sensors LDO.

Aerating the sludge from a water treatment plant consumes between 60-70% electricity.

The control systems of these treatment plants are based on accurate measurement of oxygen concentration.

*Keywords:* purification, oxygen, mud.

### 1. INTRODUCTION

Water treatment plants are equipped with the most modern type optical sensors LDO - luminescent dissolved oxygen.

Measurement method is to excite an oxygen sensitive layer with blue light.

Layer responds by emitting red light - a phenomenon called luminescence.

Thus duration is measured until no red light. It is proportional to the concentration of oxygen in the water. Such optical LDO sensors replace conventional electrochemical methods of measuring oxygen.

The figure 1 shows the correlation between the oxygen content with respect to red light.

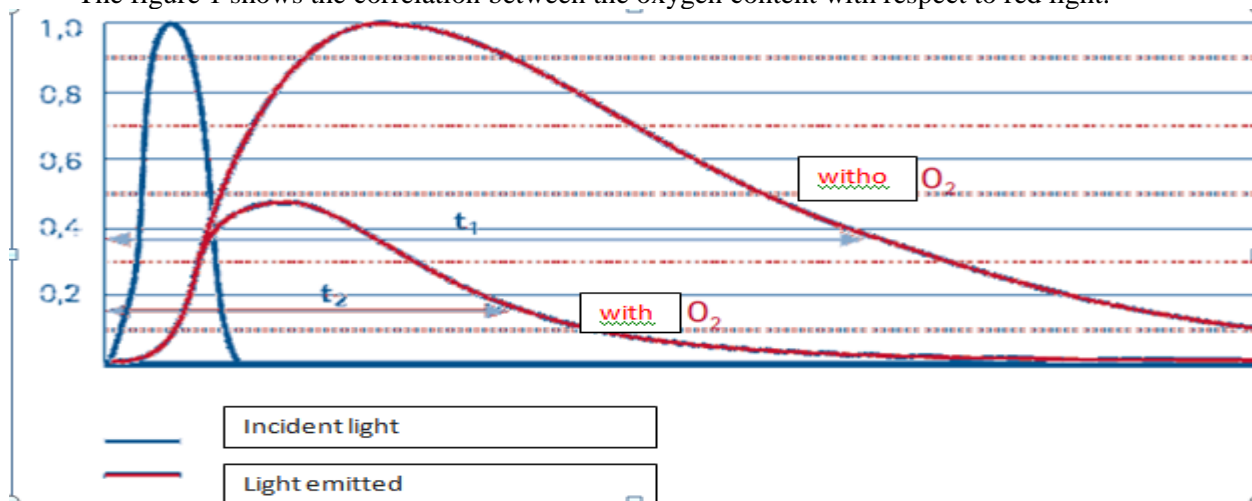


Figure 1 The correlation between the oxygen content compared to red luminescence

The oxygen content is higher as the less luminescence red persists.

## 2. CONSTRUCTION AND OPERATION OF OPTIC SENSOR LDO.

LDO optical sensor treats about 98% of wastewater, and 50% of wastewater, 50% of industrial waters. Regarding CBO2 effective is greater than 95%. More than 70% of nitrogen may be removed.

Figure 2 shows the optical LDO sensor.



Figure 2 LDO sensor cap open



Figure 3 Use SC1000 controller with a touch screen

LDO optical sensors are built with open cover and are provided with a SC1000 controller with a touchscreen.

To ensure a good oxygen transfer in the right has two aerators 15 which are each provided with two waterfalls aerated.

Each cascade is divided into three or four areas of controlled ventilation (ventilation membrane) is equipped with two oxygen probes.

The Figure 4 shows the scheme LDO sensor with reference elements.

At present wells with casings are replaced with optical oxygen measurement systems (HACH LANGE).

The reasons for the use of new measuring systems are:

- Technology LDO (HACH LANGE) does not require electrodes, electrolyte or membrane;
- Does not require membranes;
- High level of accuracy in measuring sensors LDO (HACH LANGE) especially at low concentrations of O<sub>2</sub>;
- The lowest maintenance costs.



Figure 4 LDO sensor element scheme



Figure 5. SC1000 controller on the tank by the strength installer

In figure 5 shows the SC1000 controller Marin tank installation.



Figure 6 Measurements at several points of the aerator



Figure 7 The sensor surface free of any contamination, compressed air cleaning system is not used

In figure 6 shows the measurement in several points of the meter.  
Figure 7 shows the sensor surface without contamination.

#### *Advantages of optical sensors LDO*

The advantages of optical LDO sensors are:

- Measurements with LDO probes meet the accuracy requirements;
- No calibration required, which saves time especially when outside temperatures below 0 0C;
- Very good maintenance;
- Low grade industrial pollution;
- Stability measurements;
- Very low costs for maintenance.

### **3. CHARACTERISTICS TECHNICAL OF SENSORS LDO**

LDO optical sensors have the following thermal characteristic:

- measuring principle: luminescence;
- measuring Range: 0.05 - 20.00 mg / liter  
0.05 - 20.00 ppm  
0.5 - 200% saturation;
- resolution: 0.01 mg / liter  
0.01 ppm  
0.01% saturation
- range of temperature: 0-50 degrees Celsius;
- minimum flow measurement: no;
- calibration is not required;
- sensor Materials: Stainless steel - Inox 316, Noryl
- Cable 10 m fixed cable with connectors for controller; maximum of 300 m via connector box and variable cable lengths;
- Display unit - Controller SC1000 (LXV model 401);  
- Controller SC1000 (LXV model 400/402 LXV)

SC1000 control system has the following thermal characteristics.

SC1000 control system is composed of a LXV 402 display module and one or more probe modules RXV 400.

Display module-can be attached to any type of probe, connect the sensor data indicating a color touch screen (a network SC1000 from all sensors), alarm or status messages can be transmitted over the network options.

LXV400 probe module - probe module is installed at a measuring point and allows connecting up to 8 sensors. Probe modules can be connected to a network SC1000.

#### **4. CONCLUSIONS**

Using water purification system using optical sensors LDO model obtain water purification up to 98%.

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