polymetron

Measurement of Dissolved Oxygen in Waste Water Plants

application note

9181 OXISTAT

1 - OXYGEN MONITORING IN WASTE WATER PLANTS

Most waste water treatment processes can be decomposed in three stages :

a. Preliminary treatment to remove big objects from the water.
b. Primary treatment to get rid of big particulates which can be eliminated by sedimentation.
c. Secondary treatment to remove fine particulates and chemical contaminants.

To sum-up, preliminary and primary treatment are based on mechanical actions (filtration, sedimentation,...) and secondary treatment on physico-chemical or biological principles.

zellweger analytics

The secondary treatment often consists in a two stage process :
* a biological treatment (for biodegradable products elimination),
* a physico-chemical treatment (for non-biodegradable pollutants or suspended solids elimination).
The biological treatment is also called aeration, as the principle is to put the waste water in contact with bacteria, which feed on the organic compounds (carbonaceous and nitrogenous) in presence of a high level of dissolved oxygen (bacteria need oxygen to live and be active).
The reaction in the aeration tank is the following : the bacteria consumes the free oxygen and produces CO_2 (carbonaceous compounds oxidation). In the meantime, ammonia successively oxidises into nitrites (NO_2) and nitrates (NO_3^-): this is the nitrification (nitrogenous compounds oxidation).

One of those three technologies can be implemented to ensure a correct aeration of the basin:
* the bacterial bed (the simplest)
* the activated sludge basin (the most frequently used)
* the submerged bed (new technology)

In the case of an activated sludge basin, the oxygenation can be carried out either by surface aeration (brushing) or by diffusion of air bubbles from the basin bottom.

This aeration requires energy. In fact, a lot of energy : approximately 60 to 70% of the electricity used on a treatment plant is used for the aeration.

This explains why a close monitoring of dissolved oxygen is so important :
* too much oxygen in the aeration tanks means a huge waste of money,
* not enough oxygen in the tank means a bad treatment efficiency or, worse, a biomass destruction.

The analyser is generally installed at the edge of the tank. The sensor, mounted on a probe, is immersed at a depth of 2 meter max. into the water. The 4-20 mA signal is used to adjust the air injection via a control device (PLC i.e.).

Normal working range : 0 to 3 ppm, sometimes higher. Typical working value: 1.5 ppm.

2 - SYSTEM CONFIGURATION

The 9181 OXISTAT T is dedicated to measurements in waste water plants and is composed of:
* a transmitter with 2 analog outputs and 4 alarm relays,
* a sensor with 10 meter cable,
* all the parts needed for a 2 year operation.

09181=A=XXXX	9181 OXISTAT T	
	XXXX = 0000	standard version
	XXXX = 0011	with RS485
	XXXX = 3000	NEMA 4X
	XXXX = 3011	NEMA 4X + RS485

Accessories:

08878=A=1500	stainless steel 1.5m immersion probe
08878=C=1500	stainless steel 1.5m probe extension
08878=C=1600	immersion probe holder
09181=A=4002	automatic air/water cleaning system 110 VAC
09181=A=4001	automatic air/water cleaning system 240 VAC