

● TOTAL PHOSPHORUS

EZ Series: Continuous Monitoring of Total Phosphorus

**Key Applications: Monitoring of surface water,
wastewater treatment**

Nutrients occur naturally in the environment, and are essential for the growth of aquatic organisms. Sources of Phosphate include agriculture, soil erosion, industrial effluent, stormwater and wastewater. One of the main purposes of wastewater treatment is nutrient removal to minimise the passage to receiving waters, where they may be responsible for pollution and eutrophication. Nutrient-driven algal and bacterial growth is a problem in natural waters because it depletes dissolved oxygen to levels which cannot support higher organisms. Eutrophication also harms water resources for drinking and recreation activities.

Features EZ Series Analysers

- **Continuously monitor Total Phosphorus to detect trends, peaks, and gain insights for process optimisation**
- **Accurate at low levels starting at 5 µg/L**
- **Multiple stream analysis (1 - 8 streams)**
- **In-line sample digestion capability**
- **Alternative models available to also monitor Orthophosphate or Total Nitrogen (TN)**

**Explore the full range of parameters and technologies.
Call your Hach representative today, or visit
hach.com/ez-series**



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The Why, Where and How of Total Phosphorus Monitoring

About

Phosphates have a wide range of industrial applications, but a major role is as a component of fertilisers to increase plant growth. In water, Orthophosphate is the soluble, inorganic fraction of Phosphorus, which is easily available for plants. However, bioavailable Phosphorus also exists in organic forms of low molecular weight, and labile (easily changeable) forms. It undergoes a variety of transformations in water systems; moving between the particulate and dissolved phases, between the sediment and water column, and between the biota and abiotic environment.

TP in Surface Waters

Phosphorus enters surface water from soil erosion, wastewater treatment plants and in runoff, especially in agricultural areas where manure and fertilisers are present. In 2011, the US Environmental Protection Agency (EPA) said: "Nitrogen and Phosphorus pollution has the potential to become one of the costliest and most challenging environmental problems we face." Nutrients Policy is one of five key focus areas for the Association of Clean Water Administrators, which seeks to achieve nutrient reduction in the nation's waters, and publishes States' progress in the Nutrients Reduction Progress Tracker – see www.acwa-us.org.

In Europe, the main objective of the Water Framework Directive (WFD) is Good Ecological Status for inland water bodies. The WFD does not provide specific nutrient concentration targets but requires member states to determine nutrient criteria to support the achievement of good ecological status. Exceedance of Phosphorus standards is one of the main causes of water bodies failing to achieve this.

TP in Wastewater

Wastewater treatment plants are point sources of nutrient pollution. Depending on the population equivalent and the sensitivity of the receiving water, the environmental permits

of treatment plants may therefore require the discharge monitoring of Phosphorus and Nitrogen by sampling or continuous monitoring.

The US Clean Water Act section 402 and Code of Federal Regulations establish the framework for the National Pollutant Discharge Elimination System (NPDES), requiring permits for any point source discharge of pollutants to US waters. This includes municipal and industrial wastewater treatment plants, animal feeding operations, storm sewers etc. Standards for TP and TN discharge limits are set and monitored by state and federal organisations. Similarly, in the EU, the WFD is supported by the Urban Waste Water Treatment Directive (UWWTD) which requires member states to control emissions of nutrients from point sources.

Wastewater treatment plants employ biological treatment and/or chemical precipitation to remove Orthophosphate, but the ratio of effluent TP/PO₄-P varies throughout the day (see graph), so TP monitoring provides a better opportunity for feedback control of Phosphate removal chemicals and for ensuring P-permit compliance. Continuous TP effluent monitoring can also enable prompt remedial action in case of sludge drifting from the final settlement tank.

Sampling for lab analysis can be time-consuming, costly, and incurs a delay, whereas continuous monitoring helps plant operators to understand the process conditions that affect nutrient levels so that they can optimise treatment and improve environmental performance.

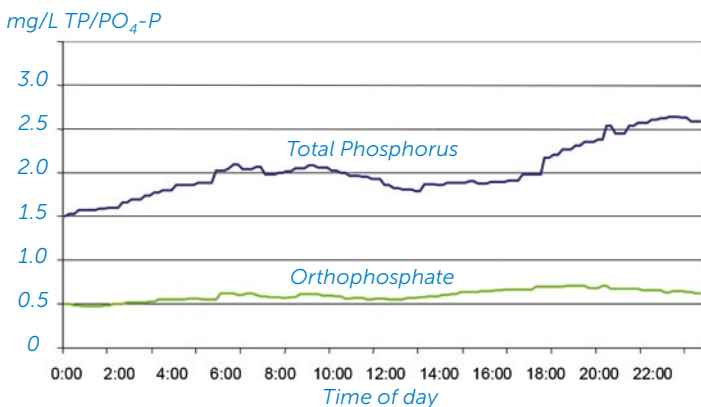
TP Monitoring Solutions

EZ Series online analysers are available in several models:

EZ76xx	Total Phosphorus & Total Nitrogen
EZ780x	Total Phosphorus
EZ786x	Total Phosphorus & Orthophosphate

Options

- Selection of measuring ranges to match your application
- Monitoring of up to 8 sample streams per analyser, reducing cost per sampling point
- Analogue and digital communication outputs
- Self-cleaning sample preconditioning panel



TP and PO₄-P concentrations in wastewater effluent