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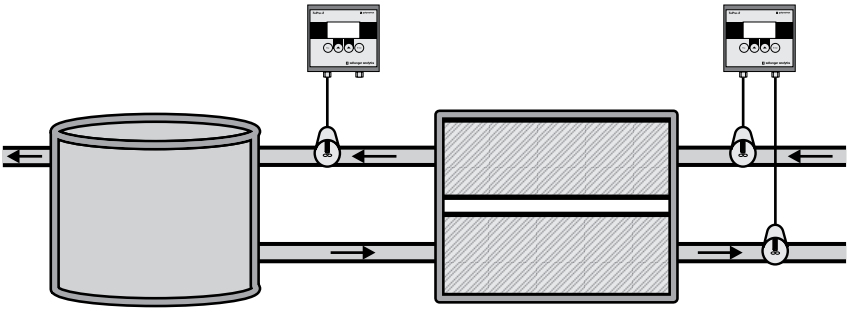
Filter alarm and backwash control with turbidity monitoring

application note



A WP-240 sensor (left), with a TxPro™-2 transmitter, is used for filter alarm and effluent monitoring of a filtration system. A second TxPro-2 transmitter (right) uses a WP-240 sensor to monitor the influent and a WP-260 sensor for backwash control.

Description

Primarily, dual–media (a coarse and a fine layer) and multi–media (several layers) filters are used in wastewater treatment plants (WWTP) to treat low concentration secondary wastewater. As the volume of solids trapped in the filter increases, the efficiency of the filter decreases. Before a solids breakthrough can occur, the filter must be backwashed. The backwash water is recycled to the head of the plant.

Critical factors

The filter must be monitored for head loss (loss of pressure between the influent of the filter and the effluent of the filter) so that backwashing begins before solids breakthrough occurs. With depth–filtration filters, solids breakthrough is a greater problem since solids are allowed by design to penetrate further into the filter. As an additional precaution, the turbidity of the filter effluent should also be monitored.

During backwash, the turbidity of the backwash can be monitored to determine when backwashing should cease.

Influent

With a down–flow filter design, water enters the top of the filter and is removed at the bottom. With an up–flow filter design, water enters the bottom of the filter and is removed at the top. During backwash, water enters at the effluent end and is removed at the influent end. Continuous turbidity monitoring at the filter influent can signal upstream treatment failures.

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Filter backwash

Backwash should continue until the turbidity of the backwash water falls to a selected level, typically 10 mg/l. Cutoff turbidity will vary depending on the performance requirements of the filter.

Effluent

Filtering is typically the last solids separation process in a WWTP. The effluent turbidity should be less than 20 mg/l. Backwash water is normally piped to the head of the plant for treatment.

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The WP-240 sensor is designed for low turbidity applications (0–200 NTU) such as filter influent and effluent. For a filter alarm application, the sensor can be channel– or pipe–mounted to the lines entering and leaving the filter. With the sensor connected to a TxPro-2 transmitter, the system should be set to alarm at a low turbidity level (50 mg/l, for example) that alerts operators at the first sign of a filter breakthrough.

The WP-260 sensor is designed for high turbidity applications (0–2000 NTU) such as filter backwash monitoring. For backwash control, the sensor can be installed in the wash water trough or waste line. The control system can be set to terminate backwashing as soon as the turbidity falls to a level found to be consistent with a clean filter.

Backwash water is usually filter effluent. Using a turbidity level instead of timing to signal backwash cutoff reduces the amount of water to be retreated.

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