Aqua MegaDisk™ Cloth Media Filter
Operational Description

The Aqua MegaDisk™ Cloth Media Filter is a complete system for continuously removing particulates from a flow stream. The system's operational strategy consists of three modes: Filtration, Backwash, and Solids Wasting. A programmable logic controller (PLC) based control system provides for automatic operation of all process modes.

Filtration Mode

The influent pipe (1) routes flow to the filter basin (2), where filtration occurs. The filter basin contains a series of circular disks covered with a unique pile cloth media. As water passes through the media via an outside-in flow path, some particulates are removed and stored within the pile cloth media while others are deposited on the pile cloth media surface. Filtered water, or filtrate, is collected in a centertube (3) and flows, via gravity, over the effluent weir and into the effluent chamber (4) prior to discharge. It is important to note that during filtration, the disks do not rotate.
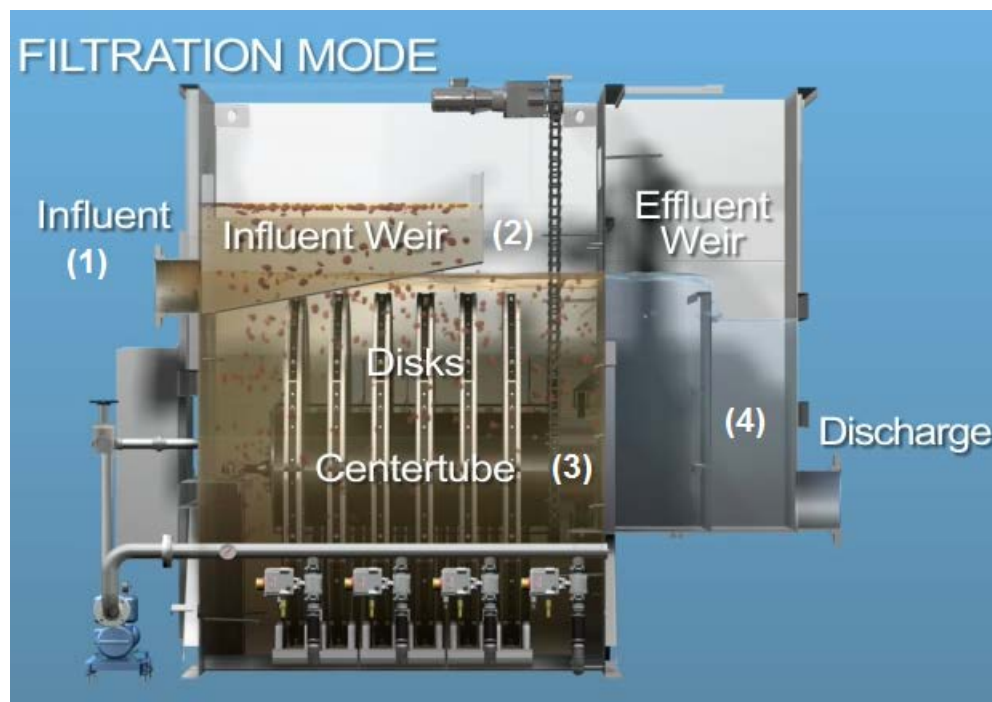
Normal Operation

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As more particulates are deposited on and within the pile cloth media, the pressure required to drive water through the pile cloth media (headloss) increases. This results in a rise in the water level within the filter basin and increased differential pressure on the pile cloth media. Upon reaching a specific basin water level set point, the PLC automatically initiates the backwash mode to clean the pile cloth media.

Backwash Mode

As the amount of particulates on and within the pile cloth media increases, the static pressure required to pass water through the pile cloth media increases. This results in an increased water level within the filter basin and increased differential pressure on the pile cloth media. Upon reaching a specific basin level or elapsed time period, the backwash mode will be automatically initiated to clean the pile cloth media.

Solids are backwashed from the pile cloth media surface by liquid suction through backwash shoes (5) positioned on both sides of each disk. These spring loaded backwash shoes contact the pile cloth media to provide the necessary suction for optimum cleaning efficiency. The disks rotate slowly while a backwash/waste pump (not shown) draws filtered water from the centertube through the pile cloth media in an inside-to-outside, or reversed, flow path. This provides effective cleaning of the pile cloth media over the entire disk. By the end of the backwash cycle, the basin water level returns to its normal operating level. The backwash pump typically directs the backwash water to the headworks.

Filtration continues while the filter is in backwash mode. This feature allows continuous filtration while maintaining efficient filter performance.
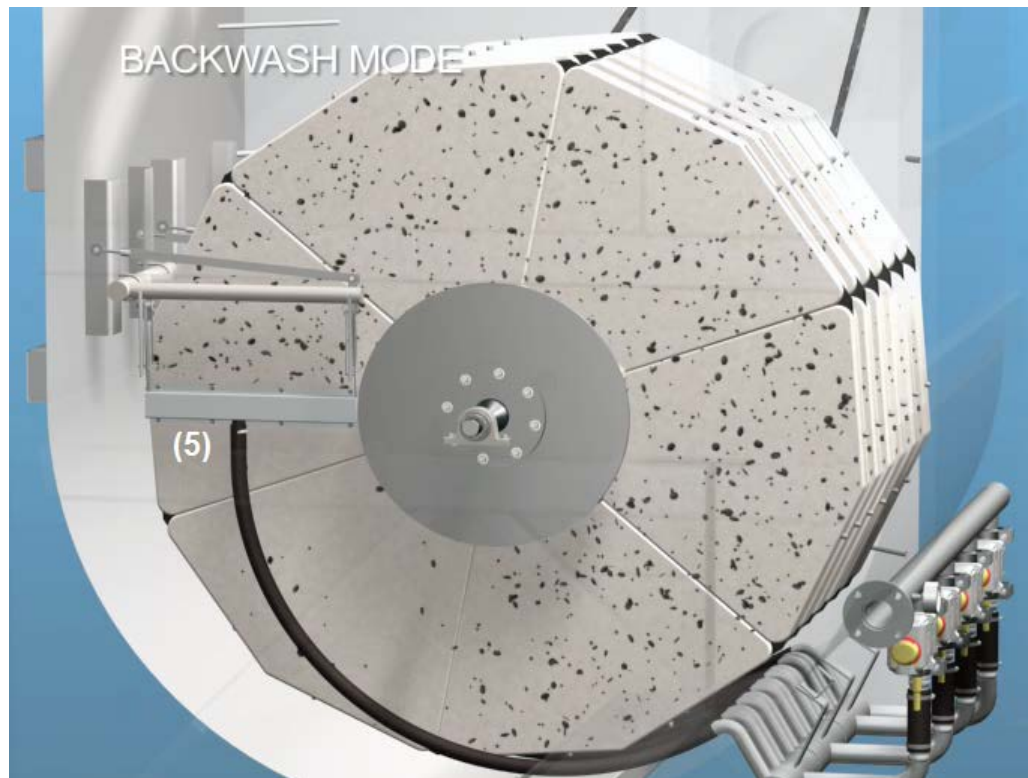
Backwash Shoes Clean Media

Solids Wasting Mode

A quiescent environment during filtration, combined with the outside-in filtration flow path, allows heavier particulates to settle to the bottom of the filter basin. Upon reaching a specific number of backwash cycles performed, or an elapsed time, the solids waste mode will be automatically initiated. The solids waste mode utilizes the backwash/waste pump to provide suction of the settled solids through a perforated solids collection manifold (6). Since solids wasting occurs immediately after a backwash cycle is completed, the backwash/waste pump remains on during the backwash-to-solids waste mode transition. The solids are pumped on an intermittent basis, typically to the headworks.

Filtration continues while the filter is in solids waste mode. This feature allows continuous filtration while maintaining efficient filter performance.
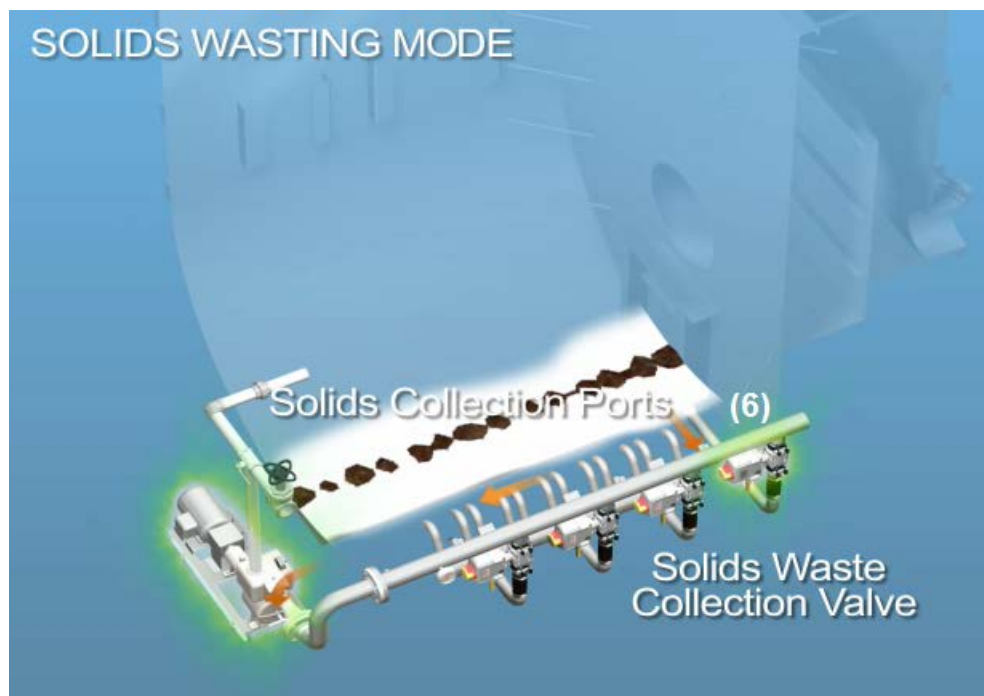

Settled Solids Removal

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Control System

Aqua MegaDisk filter operation is automatically controlled by a programmable logic controller (PLC). For multiple filter installations, the PLC based control systems are networked with the SCADA for monitoring or intercommunication purposes.

PLC Equipment Description

The PLC system monitors, regulates and sequences all automatic functions. The PLC controllers are Allen-Bradley MicroLogix Controllers. PLC inputs are via 16 point (120 VAC) discrete or 8 point (4-20mA) analog input modules, while outputs are via 16 point discrete (Relay) or 4 point (4-20mA) analog output modules. In the case of a power loss, the system will resume operation at the point from where they left off as soon as power is restored. On power-up, any multiple motor starts will commence at 10-second intervals. The PLC processors are equipped with a battery to provide ladder program and data table memory support in case of a power failure.

Automatic Operation

PLC systems allow the Aqua MegaDisk filter system to perform all the standard functions and provide maximum flexibility for variation in control strategies. Aqua-Aerobic Systems, Inc. provides all standard and customized programs through our in-house Electrical Engineering group. For the Aqua MegaDisk filter, these systems are level based with time overrides. They also provide a complement of fully adjustable set points in addition to filter system monitoring.

Manual Override

Aqua-Aerobic Systems control panels are equipped with Hand/Off/Auto (motors) switches that will allow for switching the respective hand switch from auto to the desired position to operate any component independent of the current PLC command.

Local Operator Interface Panel

Each PLC control panel is equipped with a PanelView Plus Human Machine Interface (HMI) unit manufactured by Allen-Bradley. The operator interface unit features a color LCD touch screen display and communicates directly to the PLC. This HMI unit will allow the changing of counter and timer values to adjust the various plant controls. The ability to monitor basic system status throughout the plant is also provided at this unit.

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This display contains various display pages used to provide the operator with filter status and alarm information. There are also pages from which the operator enters changes to process variables and timers to control the automatic sequencing.

Interface Operation

Some of the various screens available through the local operator control panel are listed below:

- System status
- Backwash interval/duration adjust
- Sludge waste interval/duration adjust
- Elapsed time meters and totalizers (motors and process)
- Backwash interval history
- Alarm display
- Alarm history

Controls Programming Documentation

As a standard procedure, Aqua-Aerobic Systems will provide a written control strategy with the equipment submittal information. In addition to the control strategy, we can also provide the PLC programming documentation for onsite troubleshooting purposes. Due to the proprietary nature of the program, a confidentially agreement is necessary if this information is provided.

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