Amiad Filtration Systems

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Amiad's Suction Scanning System

The following is a brief description of how a suction scanning filter operates. Dirty water flows into the filter through the inlet flange at the bottom of the filter body as shown in Figure A-1. Water then proceeds through the cylindrical 316L screen element from the inside out causing particulates larger than the filtration degree (pore size) of the screen to accumulate on its inside surface forming a filter cake. Effluent leaves the filter body through the flanged opening on the side of the filter body. A pressure differential switch (PDS) continuously senses the pressure differential across the filter screen. The PDS signals the programmable logic control (PLC) to initiate the cleaning cycle of the filter screen when the filter cake causes a pressure differential of 7 psi. During the cleaning cycle, there is no interruption of flow downstream of the filter. Pressure loss through the entire filter containing a clean screen is less than 2 psi at maximum design flow rate and is usually less than 1 psi. This results in a total pressure drop across the filter remaining at less than 2 psi most of the time but building up to a maximum of 9 psi just before a cleaning cycle is initiated.

The filter screen cleaning mechanism is a suction scanner constructed of a 316 stainless steel assembly that rotates while also moving linearly. The suction scanner consists of a central tube with six tubular nozzles equally spaced along the length of the central tube positioned perpendicular to the longitudinal axis of the central tube. A 3" flush valve connects the internal cavity of the suction scanner to atmospheric pressure outside the filter body. By opening the flush valve, the differential gauge pressure between the water inside the filter body (35-150 psig) and the atmosphere (0 psig) outside the filter body creates high suction forces at the openings of each of the suction scanner nozzles. This suction force causes water to flow backward through the screen in a small area at very high velocity at each nozzle pulling the filter cake off the screen and sucking it into the suction scanner and out the exhaust valve to waste. The driving mechanism then rotates the suction scanner at a slow, fixed rotation while simultaneously moving the scanner linearly at a fixed speed. The combination of rotation and linear movement gives each suction scanner nozzle a spiral path along the inside surface of the filter screen. The cleaning cycle is completed in about 30 seconds, during which time the nozzles remove the filter cake from every square inch of the filter screen.

A 1/2-hp electric gear-head motor drives the suction scanner. The connection between the motor and suction scanner assembly consists of a threaded shaft traveling inside a fixed threaded bearing. This arrangement gives the suction scanner its rotational and linear movements; thereby, giving the suction scanner nozzles their slow spiral motion along the inside of the filter screen. The suction scanner has a rotational speed of about 24-rpm and a linear speed of around 12-ipm at 440vac and 60Hz. Two normally closed limit switches stop the electric motor and provide feedback to the PLC to control its direction of rotation.

Excerpted from：
New Style Automatic Self-Cleaning Filters for Mill Cooling Water (Phase 1)
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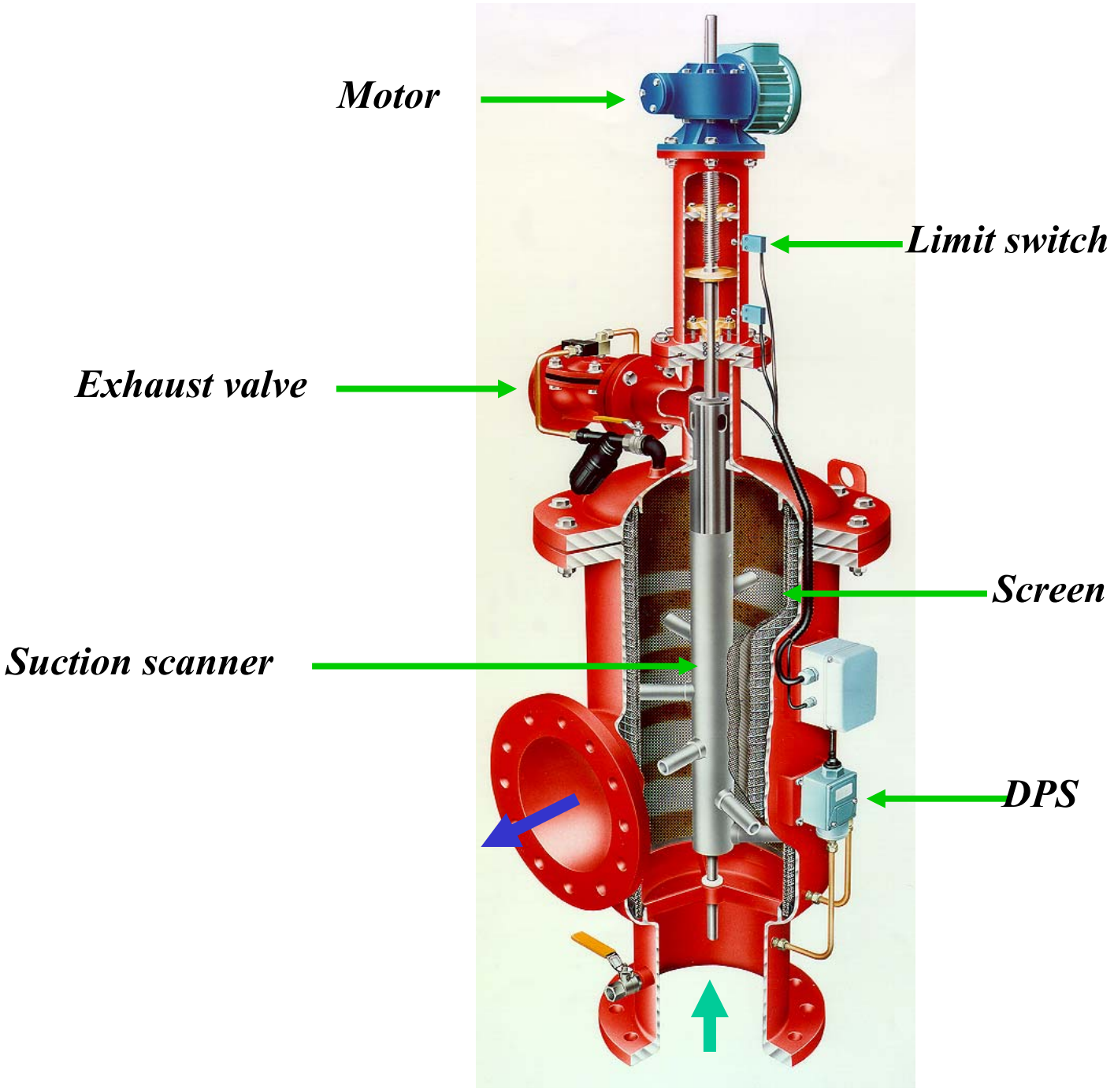

Figure A-1 Suction scanning mechanism