Filters, Pumps and Coolers with the HydroSense

Filtering the Sample

The HydroSense is designed to minimize the affect of suspended solids and turbidity through the use of the unique flow glass and the flow through system.

There are no mechanical movements, small diameter tubes, or flow restricting devices used in the HydroSense. The flow glass causes the water to sheen across a wide surface area with a depth of only a few millimeters. This large viewing area for the UV light vs. the minimal depth minimizes the influences of turbidity. The oil molecules do not have a good chance to 'hide' behind suspended particles. As well, the light path interference ratio to the large viewing area is minimized.

Should stream filtering be necessary due to a high volume or particles, algae, or debris, there are a number of mechanical methods available to filter or separate particulates prior to entry into the chamber. Use caution when considering these since they may also remove oil, resulting in a sample being measured that is not indicative of actual process conditions.

Hydrocyclone: This forces particulates to separate from the water by a centrifugal force as water is funnelled in a swirling action down a specially designed tube. The heavy particles separate out while the light and emulsified contaminants remain.

These are available for use with the pressure and flow available from the process or electric models are available. The flowrate required is quite high compared to the requirement of the HydroSense and a some of the flow will by-pass the HydroSense directly to drain.

Routine maintenance is not generally required.

Screen or Bag Fillters: These are economical and easily installed in-line. Models are available that have automatic backwash systems to periodically clean out the filter. Otherwise, a periodic maintenance program will need to be put in place to clean the filter.

As the filter traps debris, it will also start to trap oil. The sample to the HydroSense will not be indicative of the actual stream. If this occurs, the clean-out frequency should be increased.

Separators: A flow through separator relies on the natural separating properties of the sample to remove solids. The continuous flow enters a vessel of a size that will cause the sample flow to slow down considerably. Baffles will generally direct the flow up and down as it moves through the unit. This retention time spent in the separator allows heavy particles to fall and become trapped in the separator. Contaminants that are lighter than water will surface and also become trapped in the separator.

Any non-emulsified or free-oils will have a tendency to separate during this retention time. The separator design may allow these back into stream rather the retaining them.

Pumps and the HydroSense

In some applications, a continuous sample stream to the HydroSense unit is not always available. The source may not be under enough pressure or may be from a pit, pond, or stream without enough head pressure to ensure an adequate flow rate to the unit.

For any monitoring device, it is best to minimize any mechanical interference within the sample stream in order to maintain the sample in a condition most indicative of the actual stream source.

When pumps are employed, use careful consideration in the type and its installation. To choose a pump, you will need to know the height from the source to the pump inlet, the horizontal distances, the tubing size, the flow rate desired (at least .5 liter/minute for the HydroSense), and the operating voltage. Make sure the pump components are designed for water and the contaminants you may have in your water. Discuss any suspended solids and grit that may be in the sample. Confirm if the pump location is in a Hazardous Classified area.

Progressive Cavity: These pumps provide a strong positive pressure and flow. A stream by-pass is required at the HydroSense to divert any flow greater than the HydroSense can accept. Otherwise, a pressure will continue to build in the line between the pump and the HydroSense. Alternatively, a speed control can be used to run the pump at the desired flowrate. These pumps are generally of good industrial quality and wear well under a continuous run operation. If the pump runs dry, the stator can heat up wear quickly. It will likely require replacement (Dry Pump Alarms can be installed in-line). The pump will usually require a prime prior to start-up. The action of the rotor through the stator can cause a shearing of the sample. This can change the make-up of the water and its contaminants. It can reduce the size of the oil droplets, which in turn will affect the reading of an analyzing unit.

PeriIstaltic: This is a common pump style for intermittent use in water monitoring samplers and laboratory use. The sample stream does not come in contact with any components other than the inside wall of the tubing, which minimizes cross contamination. In wastewater applications, the continuous wear on the tubing requires frequent changing, particularly when there is grit in the water. Since the mechanical action is a pushing of the sample through the line, there is minimal physical affect to the water make-up.

Air Diaphram: These pumps are known for being very robust. They are typically self priming and can run dry without damage. A sample is not substantially altered since the

sample is moved through the pump in a pulsing fashion. A dampener may be necessary or an extended length of flexible tubing to absorb the pulse action prior to the sample entering the analyzer. A continuous air source or air compressor is necessary for operation. The sample flowrate can easily be controlled by adjusting the air pressure to the pump. The pump is not dramatically affected by suspended solids and grit.

Magnetic Drive Pump: This offers strong suction lift and good chemical resistance. The magnetic drive minimizes component contact with the liquid. The unit can accommodate most suspended solids. If any contaminates in the water are tacky, the pump may require cleaning prior to use after being stopped.
This is due to the non-contacting magnetics that drive the impeller. A fluid by-pass is often available directly on the pump to minimize any high pressure build-up in the outlet tubing.

Metering Pump: This pump provides an adjustable flow rate directly on the pump. The output flow is steady and controlled. It does require a prime which is done quickly and easily at the pump. Excessive grit can hamper the piston stroke of the unit, although typical suspended solids found in wastewater streams are easily handled.

When supplied with the HydroSense, an air diaphram pump is considered first because they can run dry, do not require a prime, can run continuously with little wear, and can be operated in Hazardous Locations. If an air source is not available, Magnetic Drive pumps have proven very successful for continuous operation in aggressive applications.

Cooling the Sample

The sample flowing to the HydroSense should be below 40 C for optimum performance.

Higher temperatures can affect the accuracy by introducing vapors and fog into the chamber. This hampers the ability of the light source to target the sample flow.

Heat transfer type coolers that employ a water cooled jacket circulating over the sample tubing offer a maintenance free approach. There are no moving parts, power, or air required.

Supplied units use a cool water source, such as seawater, to jacket a coil of sample tubing. The reduction in the sample temperature can typically bring the sample temperature to within 4 degrees of the cooling water.

These can be supplied with the HydroSense or sourced independently.