

Introduction to ChemScan® Products

The ChemScan® technology was originally developed with funding from NASA (for on-line analysis of nutrient solutions) and the US Navy (for on-line analysis of seawater) in 1989 and 1990, but since then has been applied to a variety of water and wastewater process monitoring and control applications.

Capabilities

The ChemScan® Process Analyzer can be thought of as a multiple wavelength ultraviolet absorbance spectrometer, similar to spectrometry systems used in the laboratory but designed to function continuously as an on-line instrument in harsh operating environments. The analyzer is capable of detecting any chemical substance that absorbs light in the ultraviolet (and blue visible) wavelength range. A total of 256 individual wavelengths are simultaneously detected by projecting light through a sample as it passes through a flow cell. These 256 wavelengths define an absorbance signature of a solution. This signature is a function of the solution's chemical composition. A branch of applied mathematics known as pattern recognition (sometimes called "chemometrics") is used to extract information concerning the presence and concentration of specific chemicals in a solution from the detected absorbance signature for the solution.

Numerous chemical substances can be individually or simultaneously detected in a process sample using the ChemScan® Process Analyzer technology. These chemical substances are defined on the current ChemScan Process Analyzer Parameter List (ASA Publication #102).

Advantages

The ChemScan® technology has numerous advantages over other types of chemical sensors and analyzers. ChemScan® does not use ion specific electrodes and therefore avoids the maintenance, accuracy and reliability issues associated with the use of ion probes for wastewater analysis.

Multiple wavelength detection permits ChemScan® to avoid the need for extensive chemical alteration of samples prior to analysis. Numerous substances can be detected directly in process samples without any chemical alteration. Other substances can be detected with very simple conditioning procedures such as pH buffering or one step reagent additions prior to measurement. This means that for many applications a single analyzer can perform multiple functions and that both capital and operating costs can be substantially reduced compared to other process instrumentation alternatives.

ChemScan® Process Analyzers have been designed to automatically compensate for turbidity variations in the process samples. All ChemScan analyzers are designed to

perform automatic zeroing and to automatically clean the manifold and flow cell using an appropriate cleaning solution.

The analyzer can be configured to monitor multiple sample lines, monitor one or more parameters and communicate analog or serial information for each parameter at each sample point to meet the monitoring and control needs for a specific application.

The system can provide a direct 4-20 mA signal proportionate to chemical concentration for each substance being monitored. The system can also provide a serial output of information for communication directly to computer and control devices.

Each analyzer has a specific combination of analysis techniques, parameters, sample lines and outputs as summarized on the attached table. For further details, consult the product literature, drawings and specifications for each product.

Analyzer	Parameters	Technique	Sample Lines	4-20 mA Outputs^c	Typical Parameters
UV-2150	1	Secondary	4 max	4 max	Ammonia; Phosphate
UV-3150	1 or 2	Primary	8 max	8 max	Nitrate; Nitrite; TON; Organics; Metals; Color; UV-254; %T
UV-4100	Up to 4	Primary and Secondary	2 ^a max	8 ^b max	Nitrate; Nitrite; Ammonia; Chloramine; Phosphate; %T
UV-6101	Up to 8	Primary and/or Secondary	8 max	16	Any UV-VIS Absorbing

a - Up to 8 sample lines can be managed using an external Sample Sequence Controller.

b - Up to 16 analog outputs can be provided through an external Sample Sequence Controller.

c - ASA recommends Mod Bus™ for applications where more than 16 output signals are desired.