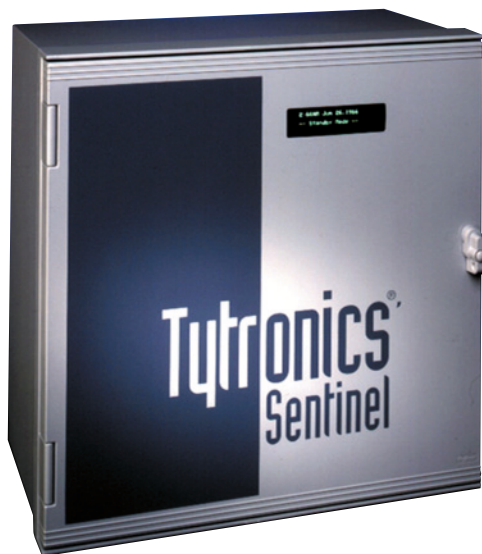


TYTRONICS® SENTINEL

THE WATCHDOG OF CHEMICAL
ANALYSIS AND WATER MONITORING



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ON-LINE ANALYSIS AND MONITORING

The Tytronics® Sentinel is the first on-line analyzer capable of both process chemical analysis and the monitoring of potable water and wastewater. Offering an unmatched performance to price ratio, the Tytronics® Sentinel provides measurement qualities and accuracies simply not seen before. There is built-in reliability, thanks to a simple and patented sample capture system and wide-bore tubing. This is an analyzer that can handle difficult and dirty samples.

Whether you are currently analyzing or monitoring liquids, or looking to do so, the Tytronics® Sentinel is your first choice in on-line analysis or monitoring.

EASE OF OPERATION

Simple menu-driven operation and a modular design make the Tytronics® Sentinel easy to use and maintain. A person with little chemical background can use the analyzer with minimal training. Simple step by step instructions are displayed to guide the operator through the procedure to complete a calibration and to set the unit in the automatic analysis mode.

THE BEST METHODOLOGY FOR THE APPLICATION

One of the keys to Tytronics® leadership in on-line analysis is the commitment to provide the best possible methodology (colorimetry, ISE, colorimetric or potentiometric titrations) for the application at hand. Thus, you can be assured that your measurements of acids, ammonia, bases, metals, nitrate, phosphate, etc., are done in the very best way.

All parameters in the Tytronics® Sentinel are user programmable. Multiple analysis methods can be configured to tackle different concentration ranges. Multiple calibration setups can be used to define different low and high range calibration curves. A cleaning cycle can be programmed to clean out or dissolve any buildup on the measurement sensor or reaction cell. Analysis, calibration and cleaning cycles can be executed at periodic (user-programmable) intervals to provide hands-free automation of the analyzer.

UNIQUE BATCH SAMPLING CAPTURE TECHNIQUE

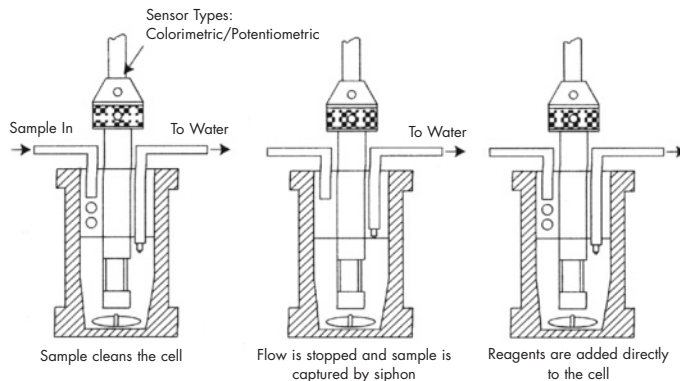
The Tytronics® patented sample capture technique is incorporated into the Tytronics® Sentinel. This means of sample capture provides the simplest and most reliable method of capturing a reproducible volume of sample that is available. The sample inlet uses 1/4" tubing, thus minimizing blockages and allowing even high turbidity samples to be readily handled.

The sample inlet system uses an internal fast loop ensuring that a fresh and representative sample is always available for analysis. Sample capture volume can range from 5 to 30 ml. This allows the Tytronics® Sentinel to be used for ppb as well as ppm levels of measurement.

Mixing is accomplished through the use of a magnetic Teflon™ coated stir bar. Two types of measurement sensors, colorimetric and potentiometric, can be mounted in the reaction cell.

Peristaltic pumps are used to introduce calibrating and cleaning solutions.

Reagents are introduced through high precision positive displacement piston pumps which require minimum maintenance.



APPLICATIONS:

- Acids
- Alkalinity
- Aluminum
- Ammonia
- Caustic & Carbonate
- Chlorine
- Chrome
- Color
- Copper
- Fluoride
- Hardness
- Hardness in Brine
- Iron
- Manganese
- Nickel
- Nitrate
- Nitrite
- Peroxide
- Phosphate
- Silver
- Sulfide
- Zinc

...and many more...

TYTRONICS® SENTINEL: DESIGNED FOR OPTIMUM PERFORMANCE

Colorimeter

The colorimetric system uses dual wavelength optical configuration and an autoblack feature which compensate for background color and turbidity. Colorimetric sensors are used to make absorbance measurements for direct colorimetric measurements (Beers Law). A submerged colorimetric probe measures the absorbance of the solution after reaction of sample and reagents. The probe is cleaned and rinsed between analyses, thus eliminating the problems of optics fouling. The probe is made of Kynar™ and the reflector of Hastalloy C, which provides excellent chemical resistance. The probe can be supplied in two different optical pathlengths, 2 and 4 cm, determined by concentration

CALIBRATION: True multi-featured two point calibration technique allows trace analysis to be routinely checked by simply using distilled water. Periodic checking of span standard can be easily performed.

Titration

Tytronics® Sentinel on-line colorimetric and potentiometric (pH and Redox) Titrations deliver simple, reliable and highly cost-effective on-line analysis. Acids, Alkalinity, Caustic, Carbonate, Cyanide, Hardness, Iron, Peroxide, Silver and many other analyses are common applications across a wide variety of process industries. Tytronics® Sentinel Titrators have the capability of performing single or dual end-point titrations. The Titrator is equipped with three detection methods (fixed, relative and derivative endpoint) to insure flexibility and accuracy. Expanded diagnostic capabilities include programmable learn cycles to automatically detect chemistry endpoints. Users may program several methods and the system allows for multiple reagents to be added. Analyses are fully automatic in all cases. Users can easily change the frequency of analysis and calibration, as well as most of the default values, to improve or customize a setup; three different access levels provide system security. The Tytronics® Sentinel also features a full auto-cleaning capability for reliability and reduced maintenance. In sum, this results in an extremely reliable, flexible, and user-friendly general purpose Titrator.

CALIBRATION: Automatic calibration is user selectable and configurable with calibration repeat and alarm limits.

ISE

Potentiometric sensors are used for ion selective measurements. The single known addition (SKA) technique compensates for electrode drift on every analysis. Tytronics® Sentinel ISE analyzer is fitted as standard with an RTD-100 temperature sensor which permits automatic temperature compensation of the analysis. Direct Method is used for high concentration analysis.

CALIBRATION: Automatic calibration is user-selectable and configurable with calibration repeat and alarm limits. The calibration is performed using the SKA method on a calibration standard.

SAMPLING OF TYTRONICS® SENTINEL ANALYSIS METHODOLOGIES

Measure	Technique	Typical Range(s)	Remarks
Acids	Titration	varies	Potentiometric titration; various acids
Alkalinity	Titration	Varies	Colorimetric titration for total alkalinity and potentiometric for P and M values.
Aluminum	Colorimetric	0 to 100 ppb to 0 to 2 ppm	Lower levels measured on potable water.
Ammonia	Colorimetric	0 to 100 ppb to 0 to 25 ppm	Uses the modified Berthelot method.
Ammonia	ISE	0 to 2 ppm to 0 to 100 ppm	Direct or using SKA method.
Caustic & Carbonate	Titration	varies	Caustic scrubber
Chlorine	Colorimetric	0 to 500 ppb to 0 to 3 ppm	Free and/or total available chlorine may be measured.
Color	Direct Spectrometry	0 to 10 to 0 to 500 Hazen	Hazen or APHA color units.
Copper	Colorimetric	0 to 500 ppb to 0 to 10 ppm	Lower levels for potable water, higher levels usually on industrial waste streams.
Cyanide	Colorimetric	0 to 200 ppb to 0 to 1 ppm	Used on purified waste water streams.
Cyanide	ISE	0.5 ppm and higher	Waste water streams.
Fluoride	ISE	0 to 2 ppm and higher	Potable water using SKA technique.
Hardness	Colorimetric	0 to 1 ppm to 0 to 10 ppm	Hardness in water or brine
Hardness	Titration	0 to 20 to 0 to 500 ppm	Complexometric colorimetric titration.
Iron	Colorimetric	0 to 100 ppb to 0 to 2 ppm	Potable water.
Manganese	Colorimetric	0 to 200 ppb	Potable water.
Nitrate	ISE	0 to 10 ppm to 0 to 100 ppm	Direct or SKA method used.
Nitrate	Direct UV Spectrometry	0 to 1000 ppm	Consult factory for suitability.
Nitrite	Colorimetric	0 to 1 ppm	Potable water derived from deep wells.
Phosphate	Colorimetric	0 to 500 ppb to 0 to 3 ppm	Used for corrosion prevention in potable, cooling tower and boiler water supplies.
Phosphate	Colorimetric	0 to 10 ppm and higher	Mainly used on waste water streams.
And many more...			



TYTRONICS®

Galvanic Applied Sciences USA manufactures the complete brand of Tytronics® on-line wet chemical and gas analyzers. The Tytronics® products include the Sentinel On-line Analyzers. These analyzers use "state of the art" technology to perform colorimetric, titrimetric, ISE, and spectrophotometric analyses. These analyzers can be configured to perform many EPA and ASTM wet chemical methods, as well as many Standard Methods. The Sentinel analyzers use a modular design that can be configured to meet the specific requirements of the customer's application.

The Sentinel Analyzers are capable of both process chemical analysis and the monitoring of potable water and wastewater. This instrument can analyze up to six streams for the same chemical parameter, at different concentration ranges. The Sentinel can measure the chemical composition of liquid processes from A (aluminum) to Z (zinc).

FEATURES

MULTI-STREAMING: The instruments can be expanded to analyze up to 6 sample streams per analyzer. The frequency and order of stream analysis is fully programmable. Each stream has a separate alarm and analog output with multi-range capability. The ability to optimize the method used for each sample stream further proves the superiority of the advanced capabilities of the Tytronics® Sentinel.

SAMPLE STREAM: Flow rate of 50 to 900 ml/min; pressures from 0 to 50 psig; temperature from 5° to 70° Celsius and 1/4" sample inlet connection.

OPERATING TEMP: 5° to 45° Celsius; vortex air cooler recommended above 45° Celsius

AUTO CLEANING: An automatic wash pump to do periodic (user-programmable) cleaning cycles; a suitable wash solution is introduced using the wash P-Pump to clean out or dissolve any buildup on the electrode or reaction cell.

ANALOG OUTPUTS: 1 output per stream; isolated 0/4 to 20 mA; fully range-programmable; maximum load 1000 Ohms; result values are held until the reading is updated.

DIGITAL OUPUTS: Dual-isolated RS-232C for printer and computer interface at user-selected baud rates, with remote control capability.

DIGITAL INPUTS: 8 digital inputs with fully programmable functions allow interface to a PLC and/or interface to voltage-free contact from sensors; expandable to 16 inputs with multiplexor board option.

RELAY CONTACTS: Programmable voltage-free contacts (minimum 8 relays configurable to N.C. or N.O.), expandable to 14 relays with multiplexor board option; contact rated at 5A at 240VAC maximum with a non-inductive load.

ALARMS: Stream-specific High and Low set point alarms; loss of sample flow alarm; fail-safe power failure alarm; general, hardware and stream-specific fault signals; result-ready, test-in-progress, calibration-in-progress and other alarm and interface functions (consult Manual); alarms can be assigned in software to voltage-free contact relays; grouping of alarms to relays is fully programmable.

DATA STORAGE: Non-volatile memory saves the last 120 analysis results and last 25 calibration results; data retention is approximately 5 years.

POWER SUPPLY: Universal power supply 100 to 240 VAC, 50-60 Hz; consumption 200 watts maximum.

ENCLOSURE TYPE: IP65, NEMA 4X, fiberglass wall-mounted industrial enclosure; modular design of the fluidic and electronic sections results in easy maintenance and simple field retrofits or upgrades.

DIMENSIONS: (W x H x D) 24" x 25" x 13" or 61cm x 64cm x 33cm

WEIGHT: Approximately 80lb (36kg) fully equipped.

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