SPA® Specified Process Analyzer

Designed for wet-chemical process monitoring

Why choose SPA ?

Industrial environments require critical parameter monitoring in order to obtain optimal production efficiency and compliance. The **Universal SPA®** Process Analyzer is a versatile, robust wet-chemical analyzer suitable for chemical analysis as well as monitoring of waste water and industrial process liquids.

For each application and each measuring range, the most suitable methodology is applied in the **Universal SPA®**. Different analysis methods can be combined in one and the same analyzer. Low TCO (Total Cost of Ownership) is guaranteed with the **Universal SPA®** through high up-times and low reagent consumption. Multiplexing up to 4 streams is possible, reducing the cost per parameter or measuring point.

Flexible & Customized analysis configuration could satisfy kinds of different wet-chemical process monitoring. Just tell us!

Unique hard-wares

Pumps, sensors, colorimeters, vessels, tubing: many wet-chemical components are carefully selected and thoroughly tested in the development of a new analyzer.

In order to cover low-level applications, We developed a highly sensitive colorimeter. The special design of the vessel eliminates direct contact of the sample with the optical parts, and allows low volume analysis.

For higher measuring ranges, a sample dilution unit can be installed inside the analyzer housing. The analyzer can also be programmed to automatically run dilution in case of over range matrices.

UNIVERSAL
Specified Analyzer

User Interface and Main Operations

Incorporated software flexibility:

The Universal **SPA®** analyzer can remotely be taken over by means of RS485-Modbus RTU/ASCII or LAN Ethernet software (*) or **external digit inputs** to realize the functions of below as:

- Remote Start
- Remote Stop
- Remote calibration/validation.

* Optional, available in future

Analysis results are displayed in **a separate table form** together with the information of *time, name and stream*, backed up by the solid state data logger, in a straight-forward, logic screen lay-out. Value displays the numerical analysis results. The **Emergency STOP** is included in RUN related screens and submenus; pressing it will terminate all analysis operations immediately until further action.

Manual control - Wet-parts

The submenu of “DO|Wet-parts” displays graphically all the wet chemical components of the analyzer. The components can be controlled by pushing the Green buttons or control each in preset period time (Turned into RED as it’s ON).
Also it’s easy to press the “STOP ALL” button to stop all wet-parts immediately.

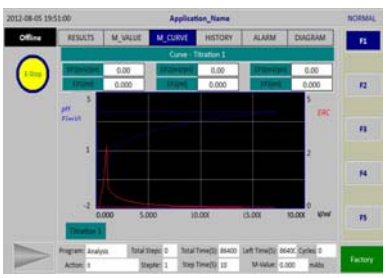
Results history and Exportable

A history of the records of the over *1 year* analysis results (approx. 100,000 results) per individual parameter can be visualized in a chronological data table or equally be exported through the sealed USB port on the front of the analyzer.

Titration Curve graph/Data submenu

Titration Only

A special data logging is available in case titration is the applied method: the titration curve is displayed, together with the actual values of the sensor, the dosed volume (ml), the threshold and the titration time. A maximum of three inflection points can be determined during one titration program. The last titration curves can be saved through the USB port.

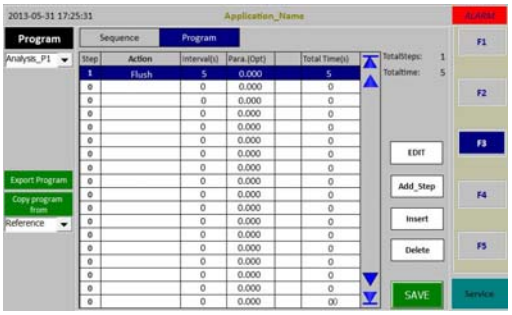


Built For Plants

A rugged design for reliable and continuous operation

The Universal **SPA®** analyzer is manufactured with high precision peristaltic pumps, very accurate dosing modules or stepper motor driven dispensers and specific in-house developed or custom-made parts.

The Universal **SPA®** analyzer is packed into a light and corrosion resistant industrial ABS plastic cabinet. The housing can also be equipped with a built-in leak detection warning in case of risk of any liquid spill. Purging with instrument air is possible in case of risk of accumulation of corrosive gases or extreme humidity. It's reliable, also very light and simple to installation and operation.
We can also provide a stainless cabinet as an optional according to different requirements.



Screenshot, Up:

Detail of program submenu.

Every step is able to edit, insert, add and delete as different analysis or configuration".

The right software offering full flexibility

The user-friendly incorporated PLC inside the universal **SPA®** controls all operations and functions of the analyzer, with several communication options and flexible inputs and outputs. The users can program the sequence and interval of analysis, automatic calibration or validation, and cleaning cycles. A maximum of 6 programs incl. Reference, Cleaning and Priming programs, can be created separately. The standard 7" touch screen can remotely controlled by different ways, i.e. external digit inputs.

Variety sampling devices to suit a wide range of applications

1. Leveler sampling with Siphon pump or valve for water like samples ranging from 2 to 20 ml possible
2. Sample loop device/ dispenser sampling for concentrated samples ranging from 0.2ml, 0.5ml, 1ml, 5ml, 10ml or much larger if necessary.
3. Flush the gap or old sample between sample tap/return and the Analyzer to get a right sample to be analyzed, which is programmed easily on a **SPA®** analyzer.

…more sampling ways available according to the applications.

We can engineer and supply virtually any "unit operation" of sample preconditioning, i.e.

- pressure reduction
- cooling
- heating
- filtration
- ultra filtration
- precipitation
- dilution to avoid crystallisation
- degassing
- homogenizing
- flow metering
- phase separation

An Integrated Approach to Process Control

Installing and site requirements

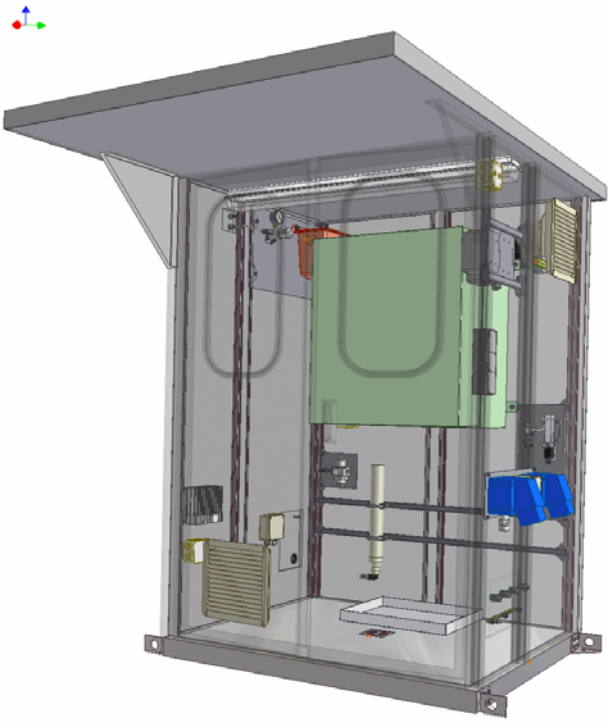
The Universal **SPA®** process analyzer is typically wall-mounted or mounted on a separate steel frame (available as an option). Stable ambient conditions will improve adequate and continuous operation of the process analyzer.

Sample preconditioning

It may also be necessary to connect dedicated preconditioning systems in order to present a suitable, reproducible sample to the analysis stage. Along in a tradition of providing complete monitoring solutions, we design and provide several self-cleaning units for sample filtration.

Single Source

Many of our customers require a total monitoring solution. We have the necessary experience to advice, manufacture and commission your analyzer system. A selection of analyzer shelters and cabinets is available to comply with safety requirements (Ex-zone) or guarantee analyzer stability.



The Single Source Responsibility Program is the UNIVERSAL quality approach to assure consistent quality until the final step: the implementation of the analyzer system.

Examples of several types of analyzer shelters. Concrete shelters can be prepared for commissioning in Ex-zone.
***Inside:** on-line analyzers installed, with sample preconditioning on separate mounting board.*

Proven Methods | Principle

Reliable Analysis Methods

- **Titrimetric:** Potential titrations, with pH, Ag, PT…
- **Ion-Selective:** Standard Addition or Calibr.Curve
- **Colorimetric**: Differential Absorb. Colorimetric (DAC)

On-line Titrimetric Analyzer

An absolute method of chemical analysis

Automatic titration is the standard, typical analysis method for many applications, but improved with the UNIVERSAL instrument's quality approach. Reagent injection is done by a million-controlled Micro-DOSI or a traditional dispenser, enabling very precise additions and giving the instrument a high accuracy. For applications requiring high sensitivity, a suitable titrimetric package is used. Low volume analysis results in a low consumption of chemicals.

On-line Ion-selective Analyzer

With A Standard Addition or Calibration Curve

The unique flexibility of the analyzer platform also allows to work with verity of ion-selective electrodes. This analysis method automatically compensates any offset-drift of the electrodes and any interfering effect of other sample constituents. The slope of the electrode can be determined automatically by analyzing a blank solution to which a standard solution is added.

In general, the Ion-Sensitive Electrodes (ISE) method has two ways to get the result by using of "Standard Addition"
Methodology or "Standard Calibration Curve" methodology which all be available in Model SPA® process analyzer
As soon as a small and precisely taken aliquot of sample has been delivered into the measuring cell, an addition of preparation buffer is carried out.
The Analyzer will "probe" the mixture and instruct the highly accurate Micro-DOSI module to add a certain amount of standard solution to the mixture. Then it will repeat the reading. From the difference it will calculate the original concentration. Thus, the result for each analysis will be validated, and not be affected by matrix effects of the sample.

The accuracy is assured to be 2% over a large range of concentration. This proves to be very adequate in cases of process control.

On-line Colorimetric Analyzer

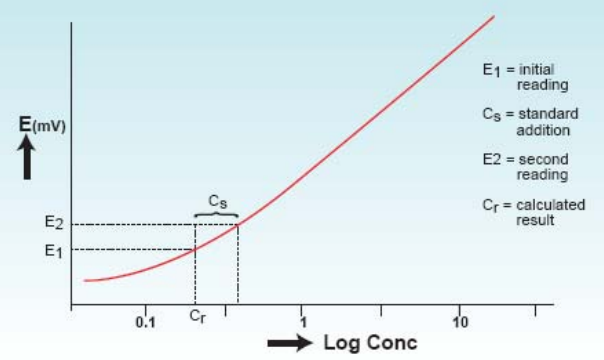
One of the few absolute methods available

UNIVERSAL Instrument has a large experience in designing on-line colorimetric analyzers, in several application fields. The heart of these systems consists of an in-house developed colorimeter with a very sensitive, long path length. Its design eliminates direct contact of liquids with optical or electrical parts, providing highly accurate differential absorbance measurements enhanced to the highest standards.

The colorimetric analysis is made by a special way- Differential Absorbance Colorimetric (**DAC**) measurement of the initial color of the sample, the developed color after the reagents have been added, and when the color formation has reached equilibrium.
In this way it avoids the fouling of the LED source or wall of glass cuvette as well as turbidity and the sample's own color are compensated for, while the accuracy and speed of analysis are assured by the equilibrium criteria.
From this differential measurements and previously stored calibration data, the analysis result is calculated by SPA.

The method also provides a unique way to automatically perform validation on the calibration data by delivering a small but exact volume of a concentrated standard solution by a Micro-DOSI or précised pump unit and making sure the result is reliable enough and thus suitable to be used for process control.
The higher accuracy calibration could be done fully automatically with a Micro-DOSI on a minimum of 1 point or up to 3x multiple points (more points possible).

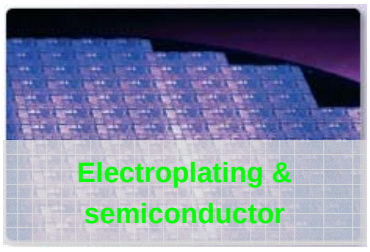
Besides for complex sample, it can control a special independent Temperature Digester by adding oxidant reagents to digest the sample to get the **total sum** of analysis parameter.



Application | Parameters

Typical Application

- Organic Acids
- Acidity
- Acrylaldehyde
- Acrylaldehyde
- Aluminium
- Ammonia
- Nitrate
- Aniline
- Blended Acid
- Boric Acid
- Bromide
- Bromine index
- Calcium
- Carbonate
- Caustic
- Chlorate
- Chloride
- Chlorine
- Chromium
- Cobalt
- COD
- Copper
- Cyanide
- Dithionite
- EDTA
- Fatty Acid
- Fluoride
- Formaldehyde
- Glucose
- Hydrazine
- Hydrochloric Acid
- Hydrofluoric Acid
- Hydroxylamine
- Hypochlorite
- Hypophosphite
- Leuco Indigo
- Iron



- Lactic Acid
- Lime
- Liquors, White, Green & Black
- Magnesium
- Manganese
- Metaborate
- Molar ratio
- Nickel
- Nitrate & Nitrite
- Nitric Acid
- Nitrogen, Total
- P & M number
- Peracetic Acid
- Peroxide
- Persulphate
- Phenol
- Phosphate, Total
- Phosphoric Acid
- Phthalic Acid
- Pickling Bath Solutions
- Silica
- Silver
- Sodium
- Sulphate
- Sulphide
- Sulphite
- Sulphuric Acid
- Surfactant
- Titanium
- TMAH
- Urea
- Water
- Zinc

.... More and More.

Up to 140 parameters possible

Technical Data

GENERAL SPECIFICATIONS

Parameters	**Multiple** Parameters (Max.**8 results**) *For more parameters, please consult our Sales or Distributors*
Analysis Methods	**Multiple** Methods *(Application Dependant)* **T**itrations *i.e. Re-dox, Complixation,Acid-base...* **I**on selective *with Standard addition or Calibration Curve* **P**hotometry *with DAC methodology*
Inaccuracy	**1~2%** relative *(Application dependant)*
Reproducibility	**1~2%** relative *(Application dependant)*
Analog inputs (programmable)	Max.**8 x** Sensors available (max. 4 electrodes) *i.e.* ***pH, mV*** *,* ***LDP*** *,****Temperature*** *and more…*
Analog outputs (programmable)	Max. **8 x** 4 -20 mA, *max. 500 Ohm load*
Digital inputs (programmable)	Max. **12x** Digital inputs, *Potential Free*
Digital outputs/Alarms (programmable)	Max. 8x Digital outs (*application dependant*) - Malfunctioning alarm - Result alarms - Status signal - External control, i.e. Valve, pump, or light etc.
Display/Human interface	LCD color touch screen, 7'' dimension, backlit
Operating temperature	Typically 5° - 35°C
Protection rating	IP 65 (per DIN 40050)
Certification	Certified to **CE** conformity
Enclosure dimensions	600 mm x 500mm x 200mm (22") (H x W x D)
Total weight	Approx.30 kg (ABS cabinet) Approx.65kg (SS cabinet)

UTILITIES

Power	230 VAC / 115 VAC, 50/60 Hz
Instrument air	Min. 4 bar (Option)
Dematerialized water	For cleaning
Drain	Atmospheric pressure, vented

OPTIONS

Calibration/Validation	Auto-calibration/Calibration (Also application dependant)
Cleaning	Auto-cleaning
Reagents Level detection	For warning of reagent consumable to empty
FiltraSampler	Self-cleaning filtration system
MultiSampler	Stream selector
Communications	RS232, MODBUS, Ethernet (*)