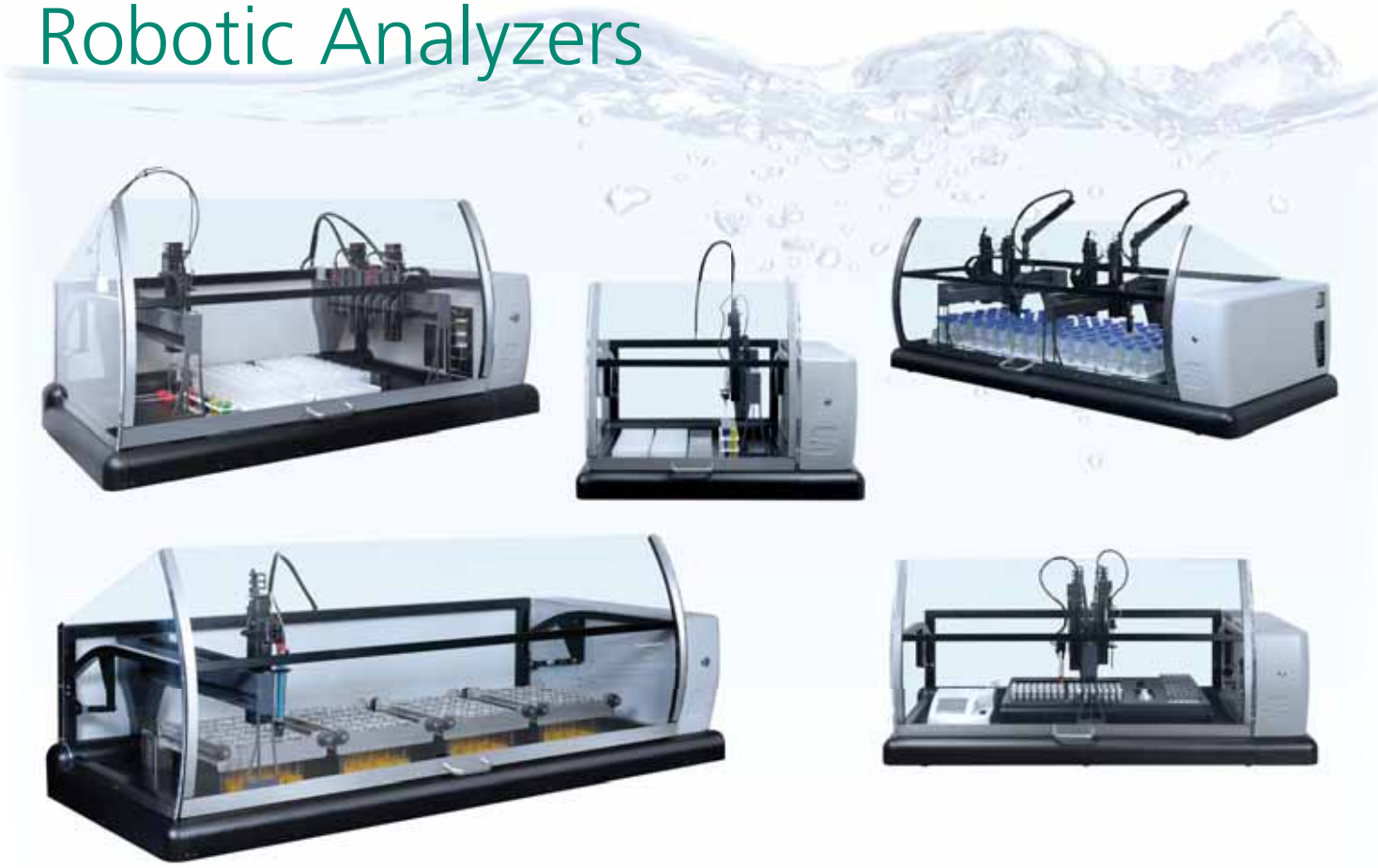
SP2000 series
Robotic Analyzers



Skalar

your partner in chemistry automation

The SP2000 series Robotic Analyzers



Skalar's sophisticated SP2000 robotic platform offers dedicated and flexible automation solutions for routine analytical testing.

The SP2000 analyzers automate all manual handling steps in the procedure of an application such as sample dilution, capping / de-capping, liquid handling, mixing, addition of reagents etc. Skalar has automated the following applications:

- **Biochemical Oxygen Demand (BOD)**
- **Chemical Oxygen Demand (COD) according to ISO 6060**
- **Test kit applications including ST-COD according to ISO 15705**
- **pH, Conductivity (EC), Alkalinity,**
- **Carbonate / Bicarbonate and other titrations**
- **Turbidity and Color**
- **Ion Selective Electrode (ISE) measurements**
- **Particle size distribution analysis in soil,**
- **Automatic sample pipetting**

And others

The SP2000 platform is designed to fit the exact requirements of a laboratory. Each configuration is set up by choosing the application, level of automation, sample capacity, sample throughput, probes/meters, racks, sample/reagent containers etc. The analyzers are fitted with protective front and side covers to comply with applicable CE regulations.

All analyzers are controlled by RoboticAccess™, a state of the art software package which has many user-definable operations, pre-defined procedure application files and includes extensive QC features which are required for today's modern laboratory.

In addition to these pre-configured automation solutions, the instruments can be built with a second robotic arm, for example, to increase sample throughput by using multiple probes or to perform two applications at the same time such as BOD and COD or sample preparation.

Biochemical Oxygen Demand (BOD)

The SP2000 automates BOD analysis in accordance with all (inter)national regulations as well as customer specific methods.

BOD analysis is one of the most common applications for water laboratories. Therefore, Skalar developed the most flexible Robotic BOD platform available today. Besides its modern design and latest technology innovations, it has a flexible set up from 18 up to 198 BOD bottles.

Each laboratory can customize the SP2000 platform to fit their exact laboratory requirements with respect to sample throughput, level of automation, sample capacity etc.

The SP2000 BOD analyzer automates:

- Bottle capping/de-capping
- Addition of Nitrification inhibitor (ATU)
- Addition of Seed
- Addition of dilution water
- Measurement of Dissolved Oxygen value (DO1) and final DO2 value
- Probe/stirrer rinsing between each measurement
- Calculation of BOD value according to EPA 405.1, ISO 5815-1, EN-1899-1/2, Standard Methods 5210 B, DIN 38409 etc.

A smart automation example is our SP2000 BOD analyzer extended with automatic pH setting of the original sample, sample pipetting and sample aeration.

SP2000 BOD in combination with pH adjustment and sample pipetting

The original sample is pH adjusted and aliquots are automatically pipetted into the BOD bottles prior to the BOD analysis procedure. The BOD analysis procedure is executed and, if necessary, the sample can be automatically aerated and homogenized before dissolved oxygen measurement. Depending on the preferences of the user the aeration and homogenization of the original sample itself can also be performed.

A second arm can also be incorporated to increase sample throughput by using multiple oxygen probes or to perform additional tasks for example other analyses such as Conductivity, Alkalinity and Turbidity can be combined with BOD on the same robot.

Chemical Oxygen Demand (COD)

The SP2000 analyzers can be configured to automate COD using the sealed tube COD method (ST-COD) according to ISO 15705/ EPA 410.4 or with the classical titration method according to ISO 6060.

The chemical oxygen demand (COD) test is a commonly used method for indirect measurement of the amount of organic compounds in water. This makes the COD value an important parameter for evaluating water quality.

ST-COD – ISO 15705

The ST-COD method is based on exactly the same reaction as described in the classical method, but instead of titration, a photometric detection is used, which saves a lot of time. Another advantage of the ST-COD method is the use of tubes containing ready-to-use reagents, which minimizes the handling of toxic and hazardous reagents.

The SP2000 ST-COD analyzer automates:

- Sample tube pick up
- Sample tube (de) capping
- Pipetting of the sample
- Sample mixing
- Sample positioning in heating reactor
- Sample heating/cooling
- Sample homogenizing
- Photometric measurement COD concentration

COD – ISO 6060

The SP2000 analyzer automates the labor-intensive COD analysis. After digestion, the operator can place the interchangeable racks with the digested samples directly onto the SP2000. This saves the operator time and avoids sample handling with dangerous reagents. The samples are cooled and are automatically titrated with iron ammonium-sulfate to determine the excess of oxidizing agent. The software calculates and stores the COD data of each sample.

Automated COD method – ISO 6060

Photometric test kit automation for water applications

The SP2000 analyzer offers complete automation of ready-to-use test kit applications such as the ST-COD, Total Phosphate, Total Nitrogen, Ammonium, Nitrate, Nitrite, Sulfide and Phenol index.

The analyzer automates all the necessary manual handling steps of the photometric test kit procedure such as sample pipetting, tube (de)-capping, addition of reagents, mixing, heating, cooling and measurement.

The SP2000 robot can be built to accommodate from 24 up to 336 tubes in one batch. The analyzer can process multiple applications in parallel or sequentially at an individual sample level. The analyzer can handle test kits and photometers from different manufacturers. A configuration with a second robotic arm is possible to increase sample throughput by using a second gripper, sample needle and stirrer or to perform additional tasks such as pH setting/measurement or sample pipetting.

pH /Conductivity / Alkalinity / Turbidity Titrations / Color in water

Accurately controlling the quality of drinking water is increasingly important.

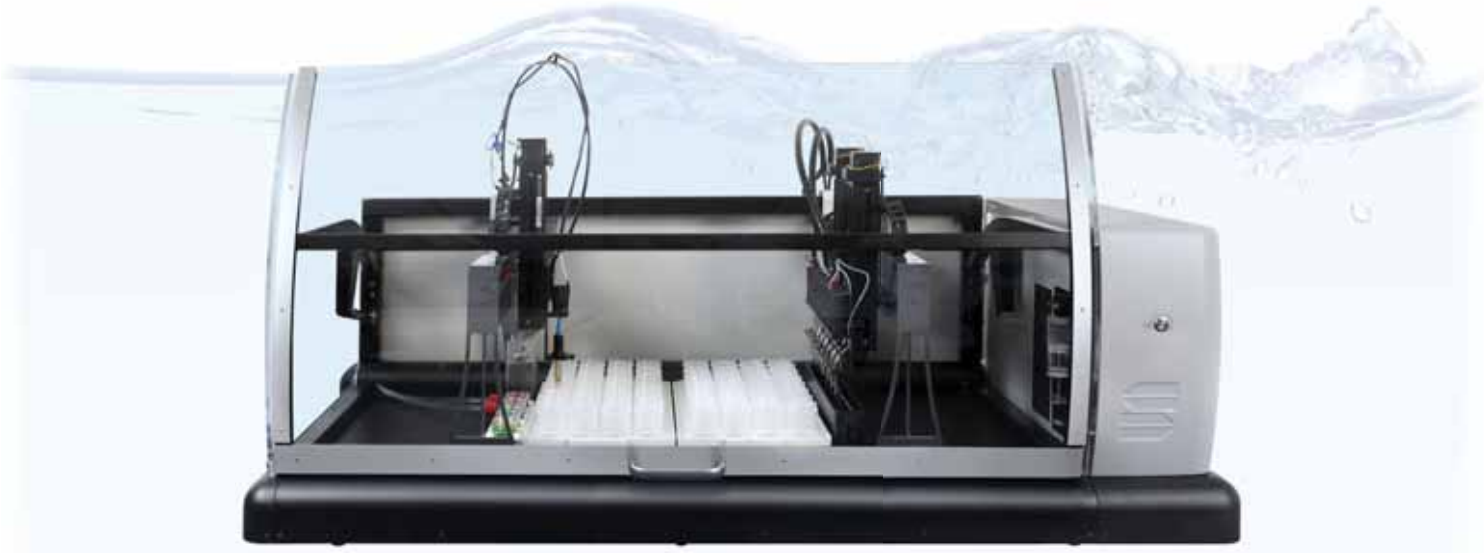
The SP2000 analyzer is extremely suitable for automating the analysis of multiple parameters all in one system. The analyzer can be configured with a capacity of 32-352 sample containers in one batch.

Custom-made configurations are also available to meet the requirements of any laboratory. These include the choice of various other applications (acidity, hardness, fluoride etc.), the running sequence and the integration of a variety of sample racks, different types of sample beakers and a compatibility with many current models of meter & probe.

Complete “walk-away” automation is provided including:

- Automatic capping/de-capping
- Measurement of pH, Alkalinity, EC, Turbidity and Color
- In-line sample filtration prior to Color measurement
- Automatic stirring
- Automatic rinsing of probe, stirrer, draining needle, filters and flow through cells
- Result calculation

Automation of Soil - pH



The soil-pH gives information about how to improve the quality of the soil, which will result in increased crop quantities and cost reduction.

Our SP2000 platform is perfectly suited for processing large quantities of soil samples every day. The system adds the required extractant to the sample, stirs, waits for a predefined time and determines the pH automatically. Any variables within these stages, such as the pre-stirring time and the stabilization criteria can be adapted at any time to accommodate all sample types and norms in one run.

The SP2000 pH- soil analyzer automates:

- pH probe calibration
- Addition of extraction solution
- Sample stirring
- Pre-defined sample settling times
- Measurement of pH
- Result calculation

The analyzer has a capacity of up to 792 containers (50 ml). For extremely large batches the analyzer can be configured with two robotic arms each with multiple electrode configurations, up to a total of 12 electrodes, for increased throughput.

Particle Size Distribution Analysis in Soil

Skalar has automated the particle size distribution analysis in soil according to ISO 11277.

The clay fraction is essential in assessing soil quality. The procedure involves very precise timing stages, tasks which are much more easily performed by an analyzer than a human operator. The SP2000 automatically adds sodiumpyrophosphate and brings the suspension to volume. The sample is homogenized for a user-defined time and after a settling period of several hours a fraction of the suspension is taken at a predefined depth and dispensed in an evaporation dish. After drying, the clay fraction is calculated.

The analyzer has a capacity from 35 up to 105 positions available for 1000 ml sedimentation cylinders and the same amount for evaporation dishes or vials. The analyzer can also provide automation of other soil fractions.

The SP2000 Clay fraction analyzer automates:

- addition of sodiumpyrophosphate
- addition of distilled water
- sample homogenizing,
- sample pipetting,
- evaporation/drying of sample trays
- calculation of the clay fraction

Software

The Robotics software is a flexible and multitasking program for controlling the robotic analyzers. While analyzing the samples, already obtained results are processed and new analyses can be prepared and scheduled.

Runs can be easily started by selecting the required application file and simply creating a user defined sample table by dragging the racks to the analyzer. An application file contains the instructions for the analyzer to perform the analysis. The BOD application for example includes procedures for the automated BOD sequence such as bottle decapping, addition of ATU and/or seed, addition of dilution water, sample homogenization and Oxygen measurement. These pre-defined application files meet (inter) national regulations or user defined requirements.

When the sample table is completed and the analysis sequence is defined, the run can be started or scheduled for another start time.

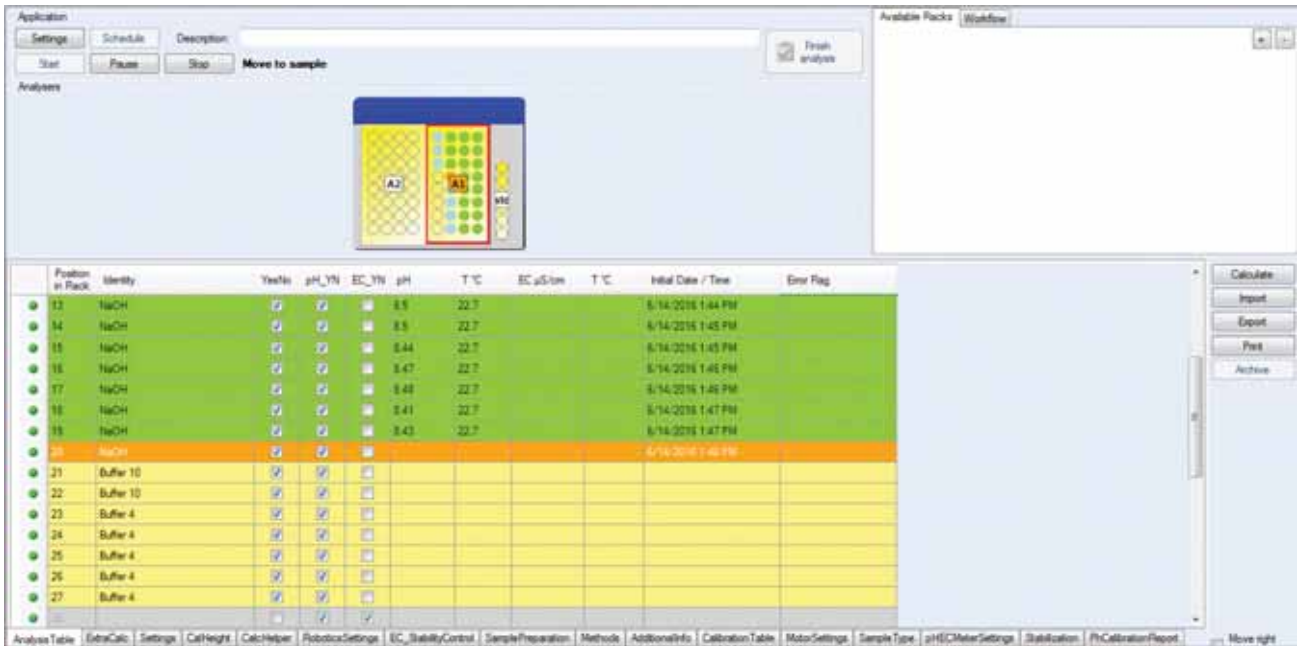
The status of the running analysis can be followed on the screen and the results are displayed in real-time. During the run, it is possible to add priority samples and exclude samples from measurement.

Results can be printed in user defined print reports and exported to Excel or LIMS and as a txt file. Completed runs can be archived as well as backed up and restored later.

Integrated Quality Control features assure accurate results and full compliance with required regulations. QC samples can be analyzed and Quality control charts together with other valuable statistical information can be created. Also CLP protocols can be included, which allow automatic actions of the Robot analyzer itself if QC and CLP limits are exceeded. This guarantees the production of highly accurate results and automatic quality control of the Robotic analyzer's performance.

Software features:

- Definable levels to prevent unauthorized access
- Scheduler for a delayed start time
- Pre-defined applications, such as BOD, COD, pH, Alkalinity, Turbidity, ISE and many more
- Customized applications can be integrated.
- Easy addition/deletion of samples during a run
- Possibility of exporting results during analysis
- Results export as txt or to Excel / LIMS
- User defined print reports
- Possibility of using Quality samples and creating Quality Control Charts



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