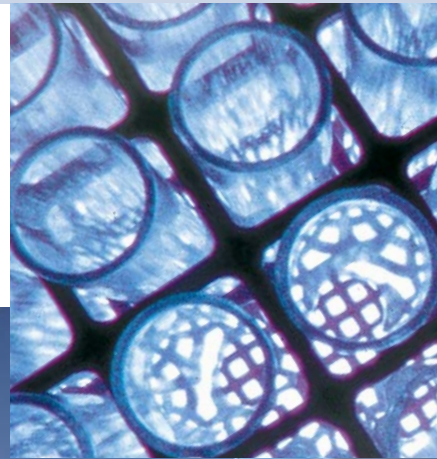


# AUTOANALYZER 3

MORE THAN 11,000 AUTOANALYZERS SOLD



# AUTOANALYZER 3

## THE LATEST VERSION OF THE MOST SUCCESSFUL CONTINUOUS-FLOW ANALYZER EVER MADE

AUTOMATED ANALYZER FOR WATER, SOIL, PLANTS, CHEMICALS AND OTHER INDUSTRIAL SAMPLES. MORE THAN 700 APPLICATIONS.

Building on the success of the AutoAnalyzer II and maintaining its reputation for high quality, every part of the AutoAnalyzer 3 incorporates improvements enabled by modern technology to bring higher performance and lower costs to routine analysis. The new modules are compatible with existing AutoAnalyzer systems for easy upgrading.

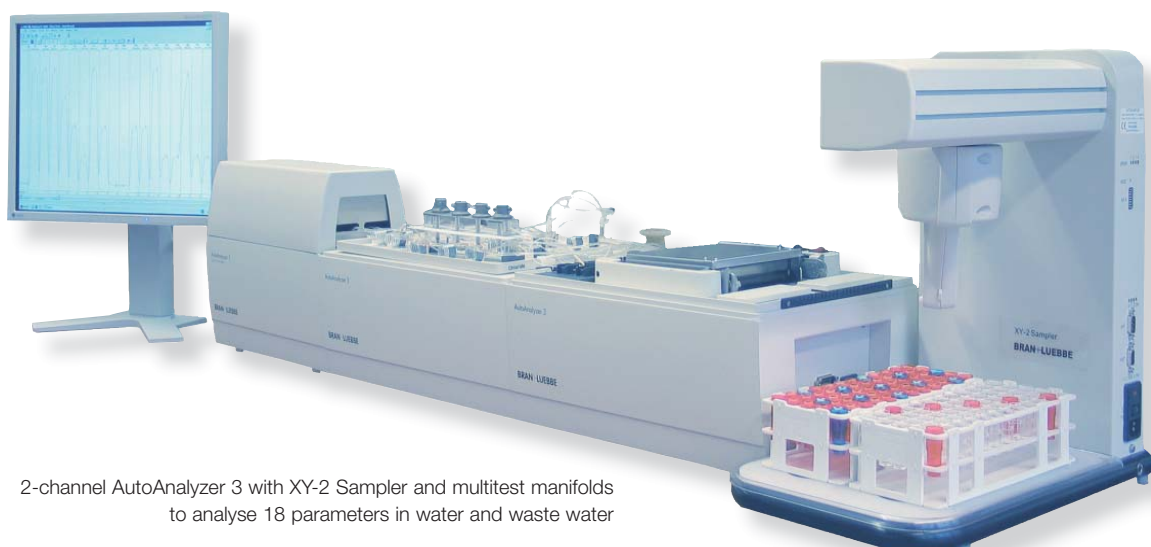
### SEGMENTED FLOW ANALYSIS

The AutoAnalyzer 3 uses all the advantages of air-segmented flow and even reaction times up to 20 minutes and complex procedures like distillation can be automated. Built-in dialyzers eliminate interference from dirty or coloured samples.

The UV digestion procedures conform to the ISO standard methods for automated total cyanide and phosphorus.

### ADVANTAGES

- ☐ Fully automatic operation
- ☐ Ultra-low detection limits
- ☐ 40 – 100 samples per hour
- ☐ Over 700 applications
- ☐ Low reagent consumption
- ☐ Compatible with all AutoAnalyzer II systems
- ☐ Quick method change-over
- ☐ Many officially approved methods
- ☐ Wide range: dilution is rarely necessary



2-channel AutoAnalyzer 3 with XY-2 Sampler and multitest manifolds to analyse 18 parameters in water and waste water

# MODULAR DESIGN FOR HIGH FLEXIBILITY

A 1-channel AutoAnalyzer 3 system comprises a sampler, pump, chemical manifold, detector and PC. The system can easily be extended by adding a second chemical manifold and detector:

the analyzer then becomes a 2-channel system which measures two analytes at the same time. Other modules can be added as required, up to a total of eight channels.

With the dual-probe option, available for the Compact Sampler and the Sampler 5, two different preparations of the same sample – e.g. an untreated water sample and the same sample digested for total N and P - can be analyzed at the same time.



Dual-probe option fitted to Compact Sampler

## SAMPLERS TO MATCH ALL WORKLOADS

### XY-2 AND XY-3 SAMPLER

High capacity random access sampler for high workloads, accepting many different sizes of sample cups and tubes

- ☐ Up to 180 sample cups or tubes in 2 racks.
- ☐ Separate rack for standards.
- ☐ Any size or shape of sample rack which fits into the sampler can be used.
- ☐ XY-3 is similar to the XY-2, but with 3 sample racks.



### COMPACT SAMPLER

Random access sampler for medium workloads

- ☐ Takes 100 sample cups up to 5 mL
- ☐ Remote control from PC or manual control from built-in keypad
- ☐ Dual-probe option for 50+50 cups



### SAMPLER 5

Economical sampler for smaller workloads

- ☐ Takes 40 sample cups up to 5 mL
- ☐ Dual-probe option for 40+40 cups

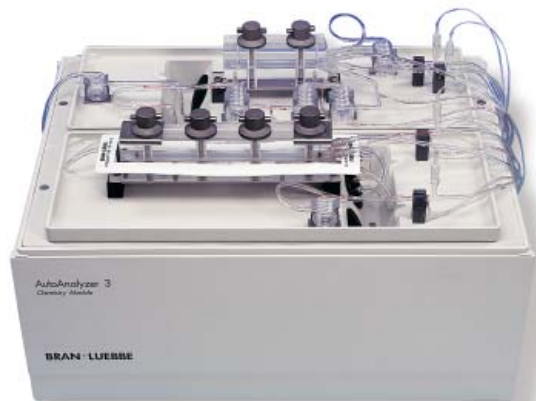


# METHODS

EACH CHEMISTRY MODULE HOLDS 2 METHOD MANIFOLDS.

Most AutoAnalyzer II methods show higher performance when run on the AutoAnalyzer 3, thanks to the higher sensitivity, speed and precision of the new system.

- ▢ Mixing coils are made of glass, so as to be chemically inert and give a clear view of the flow
- ▢ A close-fitting cover reduces the effect of changes in lab temperature
- ▢ Liquid drain tube takes spilt fluid out of harm's way
- ▢ New heating bath with high-precision proportional control and replaceable coil improves reproducibility



Chemistry module fitted with two multitest manifolds for water analysis, with on-line dialysis to remove interference from suspended solids and coloured compounds in waste water

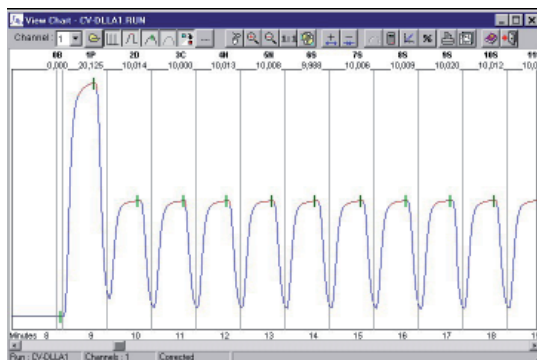
Mixing coil made from close-tolerance glass for high reproducibility and precise flow



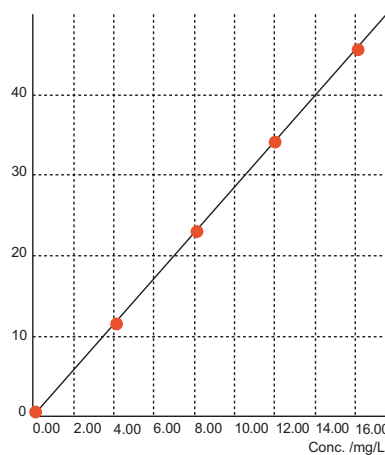
## WIDE RANGE

With the AutoAnalyzer 3 high-performance colorimeter, method range is widened in three ways

- ▢ The flowcell design extends the linear response at high concentrations
- ▢ The high sensitivity detector allows low absorbances to be measured
- ▢ The high digital resolution (24 bits) measures very small absorbance changes accurately, even at high full-scale settings.



Colorimeter with 50 mm flowcell: narrow linear range



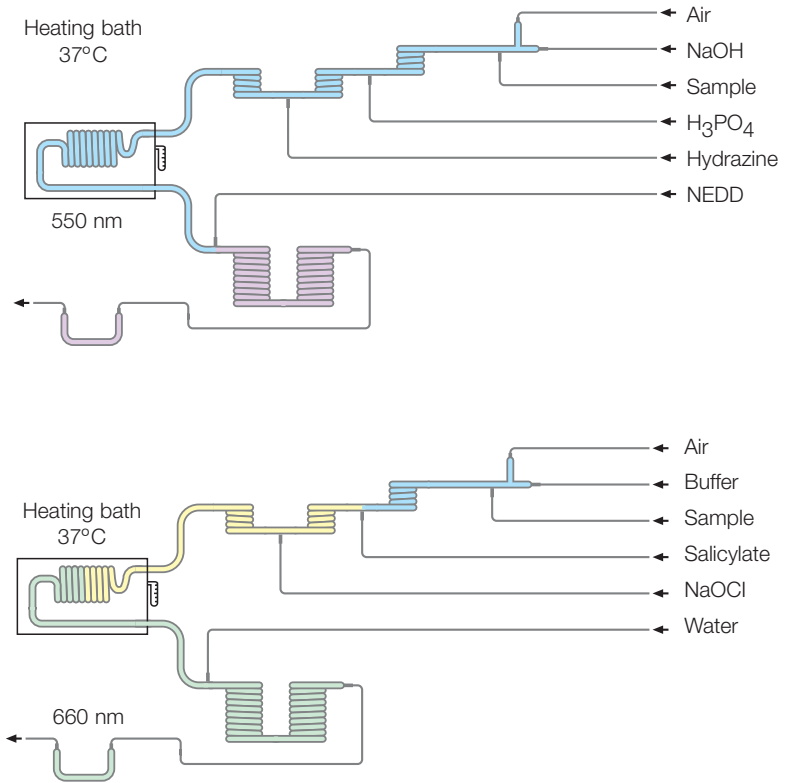
AA3 colorimeter: linear range is more than 5 times higher

# MULTITEST MANIFOLDS

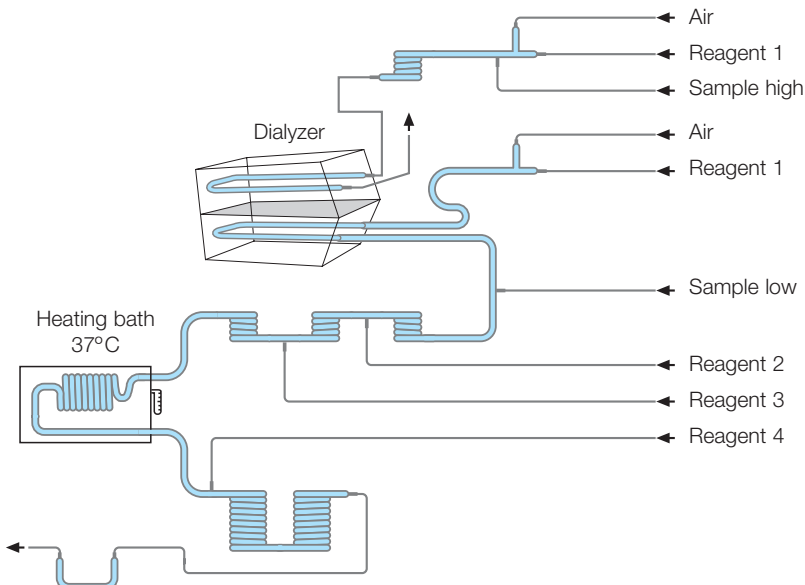
A MULTITEST MANIFOLD CAN BE USED FOR UP TO 20 DIFFERENT ANALYSES, ONE AFTER THE OTHER. ONLY THE REAGENTS AND THE COLORIMETER WAVELENGTH NEED TO BE CHANGED BETWEEN TESTS.

## ADVANTAGES

- ☐ Special multitests are available for:
  - water and waste water
  - soil and plant extracts
  - seawater
  - tobacco
- ☐ Method change-over is easier and quicker than for a system with separate manifolds for each parameter
- ☐ Bench space requirement is less than for a multi-channel system
- ☐ Maintenance is easier and cheaper
- ☐ Purchase cost is lower
- ☐ Multitest methods are EPA-approved



Multitest manifold configured for nitrate (top) and ammonia.



Dual-range method for water and wastewater analysis. The manifold can be run with or without the dialyzer, depending on the type of sample being analyzed.

## DUAL-RANGE METHODS

Most multitest methods are also dual-range – with separate pump tubes for high and low ranges they can cover an extremely wide spread of sample concentrations. For example, the AutoAnalyzer 3 method for nitrate in seawater can measure up to 8500 µg N/L and has a detection limit of 0.14 µg/L. The same manifold can be used to measure ammonia and silicate.

The dialyzer option available on waste water methods eliminates interference from dirty or coloured samples run on the high range.

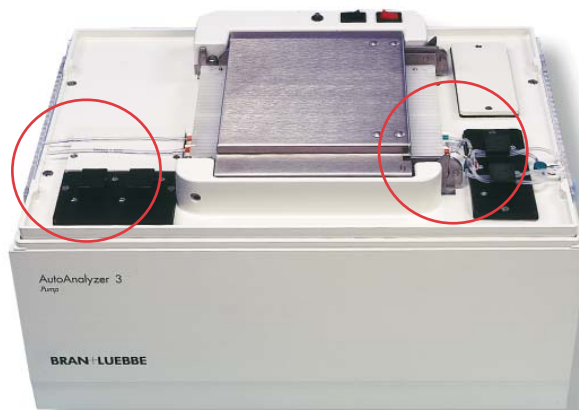
With the automatic range switching option fitted to the AutoAnalyzer 3 pump, the analyzer can switch from one range to the other automatically.



# HIGH PRECISION PUMP

HIGH PRECISION PUMP WITH IDENTICAL FLOW RATES TO AUTOANALYZER II SYSTEMS FOR FULL COMPATIBILITY TO EPA, AOAC AND ISO STANDARD METHODS AND THE LIBRARY OF OVER 700 AUTOANALYZER APPLICATIONS.

- ┌ Multi-speed motor with high speed for fast wash-out
- ┌ Integrated tray for hydraulic components
- ┌ Optional valves for auto-dilution or reagent switching
- ┌ Leak detector stops the motor automatically if a spill occurs
- ┌ Drain tube takes spilt liquid safely out of the pump
- ┌ Control from a PC or on the pump itself



Pump with one set of air valves (left) and one set of dilution valves (right).



High precision pumping: each liquid segment contains the same volume of reagent and sample.

## AIR VALVES

Electronically controlled air valves provide precise air bubble injection. Each liquid segment has the same volume and contains the same proportion of sample and reagents. This improves reproducibility.

One or two sets of air valves, each with space for 4 air lines, can be fitted to the pump. An external air supply or a single pump tube can be used to feed the air lines, saving pump space.

## DILUTION VALVES

With the optional dilution valves, auto-dilution can be added to many existing methods and dual-range multi-test methods can change range automatically, so that off-scale samples are re-run at a higher dilution.

Alternatively, the valves can be used to switch between reagents and wash, providing automatic start-up and shut-down.

## AUTOANALYZER 3 – OFFICIALLY APPROVED METHODS

### AOAC

Protein (as TKN) in animal feed digests  
 Phosphorous in fertilizer  
 Fluoride in plant extracts  
 Potassium in fertilizer  
 Vitamin B2 in food extracts  
 Vitamin B3 in food extracts  
 Vitamin C in food extracts

### ISO (SOME PENDING)

Nitrate  
 Nitrite  
 Ammonia  
 Phosphate  
 Total P with UV digestion  
 Total cyanide with UV digestion  
 Chloride  
 Phenol  
 Silicate  
 MBAS  
 Chromium

### EPA

Alkalinity  
 Ammonia  
 Chloride  
 Nitrate  
 Nitrite  
 Total N  
 Total P  
 Phenol  
 Phosphate  
 Silicate  
 Total cyanide with UV digestion and distillation

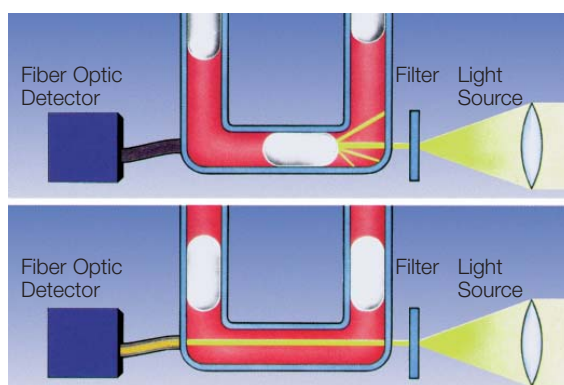
# COLORIMETER

HIGH SENSITIVITY DIGITAL SPECTROPHOTOMETER WITH FULL SOFTWARE CONTROL FOR ALL FUNCTIONS.

High resolution increases the working range for all methods. Bubble-through-the flowcell operation increases sampling rate. The linear range is extended by a factor of 1.5 for most methods by the flowcell design, with planar end faces and fibre-optic coupling to ensure parallel light transmission through the sample. Dual-beam operation with same-wavelength compensation gives low drift, even at very high sensitivities.

The colorimeter's high sensitivity results in low detection limits, for example 0.12 µg/L for phosphate in seawater.

Other detectors such as a flame photometer and UV spectrophotometer are available for special applications.

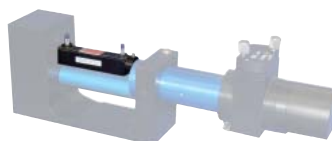


Bubble-through-the-flowcell operation

## FLOWCELLS

A wide range of flowcells is available, with different lengths and internal volumes to provide an ideal match to every method and to allow bubble-through operation even at low flow rates.

A special 500 mm flowcell, with debubbler, is also available to enhance the peak height at nanogram concentrations.



Optics module with 50 mm flowcell

Higher analysis rates and lower reagent consumption are achieved by a software algorithm which monitors the detector output 140 times per second and switches off the output when a bubble is present in the flowcell.

This allows bubbles to pass through the flowcell without affecting the signal. The result is that dispersion is reduced and no flowcell pull-through pump tube is needed.

Most methods run at least 10 samples per hour faster on the new colorimeter, with lower carry over. A low-volume debubbler is available for special applications.

## AUTOMATION THROUGHOUT THE ANALYSIS

### THE AUTOANALYZER 3 CAN

- ▣ Set baseline and sensitivity
- ▣ Resample cups after off-scale peaks
- ▣ Dilute and re-run off-scale samples
- ▣ Automate UV digestion (ISO method)
- ▣ Automate sample distillation (EPA method)
- ▣ Calculate and store results
- ▣ Create quality control charts
- ▣ Wash out and switch pump off after analysis
- ▣ Input and output LIMS data

# SPECIFICATIONS

## SAMPLERS

### SAMPLER 5



### COMPACT SAMPLER



### XY-2 / XY-3 SAMPLER



No. of samples	40	100	XY-2: up to 180 / XY-3: up to 270
No of samples, dual-row mode	40 + 40	50 + 50	-
No. of standards	0	0	XY-2: 10 / XY-3: 11
Sample cup volume	0.5, 2, 4 or 5 mL	0.5, 2, 4 or 5 mL	0.5, 2, 4 or 5 mL
Sample tube diameter	-	-	13, 16, 20, 25 or 30 mm
Sample tube height	-	-	100 mm standard, 150 as option

## PHOTOMETER

Type	dual beam with same-wavelength reference
Wavelength range	420 - 900 nm standard 340 - 900 nm option
Flowcell design	glass barrel with sapphire light pipes
Flowcell pathlength	10, 30 or 50 mm
Flowcell i.d.	0.5, 0.7 or 1.0 mm
Blank correction	optional reference flowcell for simultaneous true correction
Beam splitter	randomized quartz optical fiber bundle
Light source	krypton lamp or LED
Linear range	0 - 1.8 AU
Digital resolution	2 <sup>22</sup>
Sensitivity	max. 0.007 AUFS
Input and output	digital
Leak detector	standard

## PUMP

No. of pump tubes	28
No. of air lines	8
Air injection	electronic control with timing by optical switch
Pump control	manual or from PC
Speeds	normal, high, intermittent
Leak detector	standard
Safety switch	magnetic, automatic

## CHEMISTRY MODULE

No. of manifolds	1 - 4, depending on methods
Leak detector	option
Hydraulic components	2.0 mm high precision glass, with Pt inserts
Heating baths	25 - 120 °C, with user-replaceable glass or PFA coils
Standard methods	ISO, EPA, DIN, USP and AOAC approved methods available

## WEIGHTS AND DIMENSIONS

ALL MODULES ARE MULTI-VOLTAGE, 50/60 Hz.

MODULE	WIDTH CM	DEPTH CM	HEIGHT CM	WEIGHT KG	POWER CONSUMPTION
Sampler 5	33	51	30	13	50 VA
Compact Sampler	30	39	38	11	100 VA
XY-2 Sampler	42	27	44	12	30 VA
XY-3 Sampler	44	29	51	15	75 VA
Pump	40	30	29	16	50 VA max.
Chemistry module with heating baths	40	30	29	3	100 VA
Colorimeter	32	16	29	2	50 VA