ION³

Potentiometric

Stripping

Analyzer

STEROGLASS®

THE ULTIMATE SOLUTION FOR TRACE ANALYSIS

10
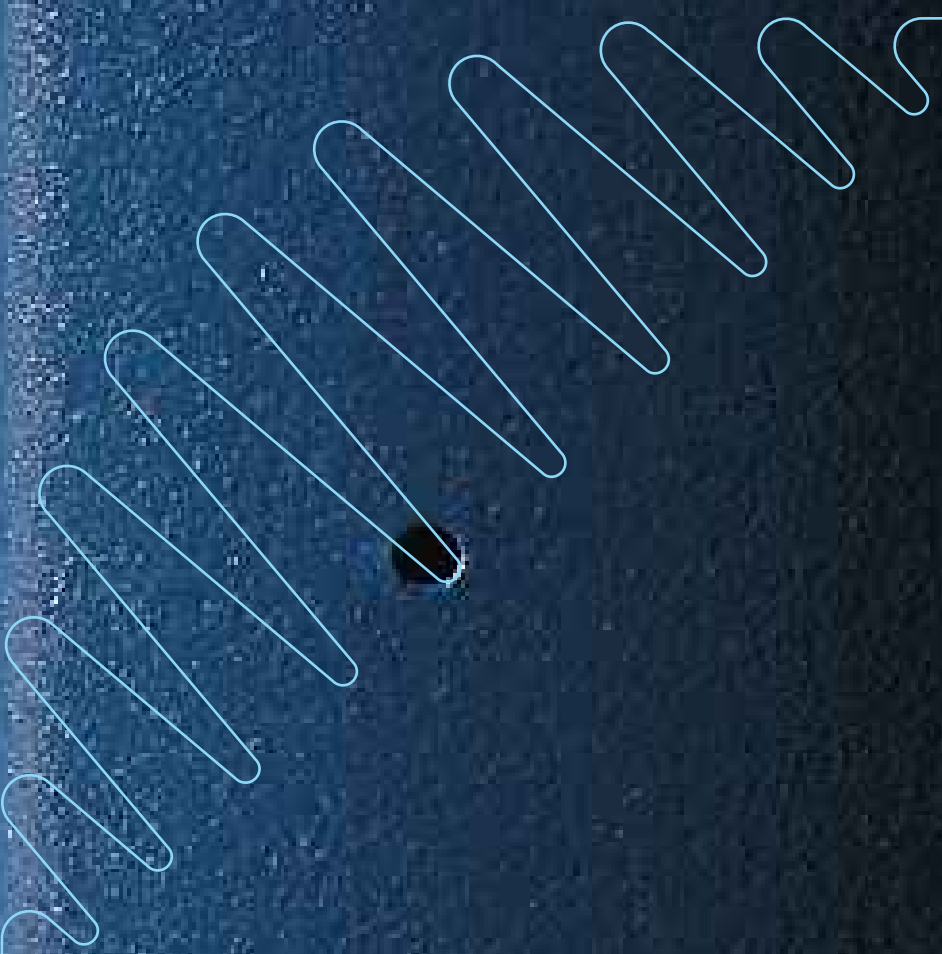
FOR HEAVY METAL DETECTION

AT3

Potentiometric Stripping Analyzer

FROM THE MOST SOPHISTICATED APPLICATIONS IN THE RESEARCH FIELD TO THE ROUTINE ANALYSES WITH ION³ USING THE POTENTIOMETRIC STRIPPING TECHNIQUE.

BY MEANS OF ION³ PSA, THE ANALYSIS OF HEAVY METALS BECOMES EASY AND ECONOMICALLY ADVANTAGEOUS.

In compliance with the present regulations (i.e. EC COMMISSION REGULATION no. 466/2001) on the maximum concentration level, heavy metal detection in waters, air, ground, food, oil and cosmetic fields has become fundamental for the public and environmental health. ION^3 is a high-sensitivity analysis unit able to detect metal traces in different simple or complex matrices (water, food, chemical, pharmaceutical and oil products). The computer-assisted potentiometric stripping technique used by ION^3 is the result of the "lucky" union between a reliable, reproducible electro-chemical analytic technique, tested for a long time, and the computing power of the modern personal computers. High speed to measure the potential variations, with their subsequent processing, allows to reach a high detectability level (often below ppb). Thus, very small metal traces can be accurately and repeatedly detected and quantified. Furthermore, by this technique the SIMULTANEOUS analysis of DIFFERENT METALS in the same matrix can be performed. It must be noted that, unlike other similar techniques, analysis can be run on the "ORIGINAL" sample too, that is matrixes do not require any chemical or physical pre-treatment; moreover, samples are not destroyed during analises. This makes ION^3 particularly suitable for routine analyses and for use by non-particularly skilled operators. Spot on-site analyses can be performed thanks to the compactness and small size of the unit.

The software, complying with the GLP/GMP directives, runs under Windows 95/NT and is particularly user-friendly. Not only does it enable to manage the unit and the analysis thoroughly, but it also allows to obtain detailed graphic reports and complete statistic analyses on the measurements performed.

In order to detect the concentration of metal traces in a solution, it is possible to follow an electrochemical technique using the reduction potential of an element (to dose traces of it in a solution).

To detect the metal, the sample has to undergo a suitable treatment depending on the kind of matrix in which the element is present. Moreover, the quantity of sample to be taken depends on the metal concentration. The element to be dosed is turned into metalstate by applying a well-defined negative potential.

The unit uses three electrodes to perform the analysis:
- Glassy carbon graphite electrode
- Ag/AgCl reference electrode
- Platinum electrode

The cell where the electrochemical reaction takes place must contain a support electrolyte allowing the migration of the charged species towards the graphite electrode. Normally, this electrolyte is made of an acid solution.
The ionic mobility is possible thanks to a stirrer run by a microprocessor.

Antimony

Arsenic

Bismuth

Cadmium

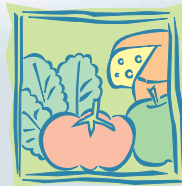Cobalt

Copper

Gallium

Indium
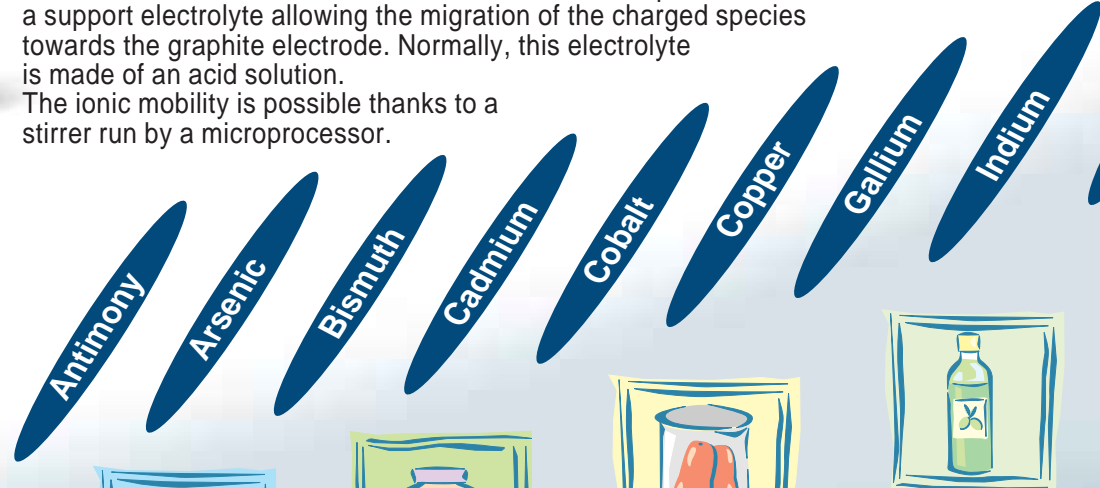
Tap water
Waste water
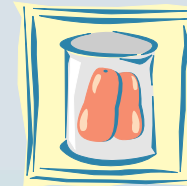Sea water

Air
Pollution

Wine
Beer
Vinegar

Foods

Milk
and dairy-products

Vegetable preserves

Metal release tests
on food containers

Alimentary oils

The potentiometric stripping technique is very sensitive. In fact, metal traces can be detected up to ppb level.

List of the metals detectable by means of potentiometric stripping technique.

NOTE: not all metals can be detected in every matrix.

STEROGLASS

Potentiometric Stripping Analyzer

ION³
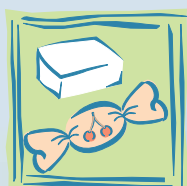
Iron

Lead

Manganese

Mercury
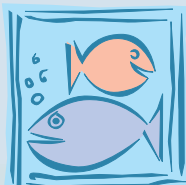
Nickel

Selenium

Thallium
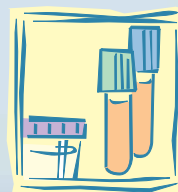
Tin

Zinc

Sugar and sweets

Fish

Soils

Feed/Forage

Cosmetics and Pharmaceutical products

Urine and Blood

Chemical products Reagents

Petrolchemistry

The first operating phase preceding the very analysis, called plating, consists in coating the surface of the graphite electrode with a film of mercury.
This procedure, usually called plating, has to be carried out only once before starting the analyses, letting the mercury film work with several samples.

When running plating procedure, a very negative reduction potential is set by using an acid mercury salt solution (II). At the end of this phase (usually lasting one minute), the electrode is ready to amalgamate the metals to be analyzed.
The simple reaction of the electrode is the following: $Hg^{++} + 2e^- = Hg$

At this point, the plating solution is replaced with the sample to be analyzed which has previously been acidified. By setting a more negative potential than the metal reduction potential in the solution on the graphite electrode, the metal ion is able to migrate towards the electrode itself, where it reduces by amalgamating with mercury.

The quantity of metal settling on the electrode is proportional to the electrolysis time. Therefore, small traces will take longer to accumulate.

ION³ PSA PERFORMS THE FOLLOWING TECHNIQUES

POTENTIAL STRIPPING ANALYZER (PSA):

Detects most heavy metals.

CONSTANT CURRENT STRIPPING ANALYZER (CCSA):

Detects metals such as Hg, As, Sb, Sn and doses some metals for which the amalgam on the mercury film (Fe, Co, Ni, Se) cannot be created.

QUANTITATIVE ANALYSIS

Each analytical detection is performed by means of the typical standard addition method, which allows to obtain a regression line from which the unknown concentration is automatically taken.

ION³ PSA uses internal standard addiction, thus avoiding matrix effect errors.

The unit is made of an aluminium melting chassis equipped with an arnite head where the reference electrode (Ag/AgCl), the measurement electrode (glassy carbon graphite) and the platinum electrode are inserted. A chemically inert glass stirrer is inserted into a rotating device without metal parts to allow easy and accurate cleaning. The special magnetic induction mechanism protects the stirrer's motor against acid smokes coming up from the cell. The cell insertion and removal operations are made easy by a fast screwing device.
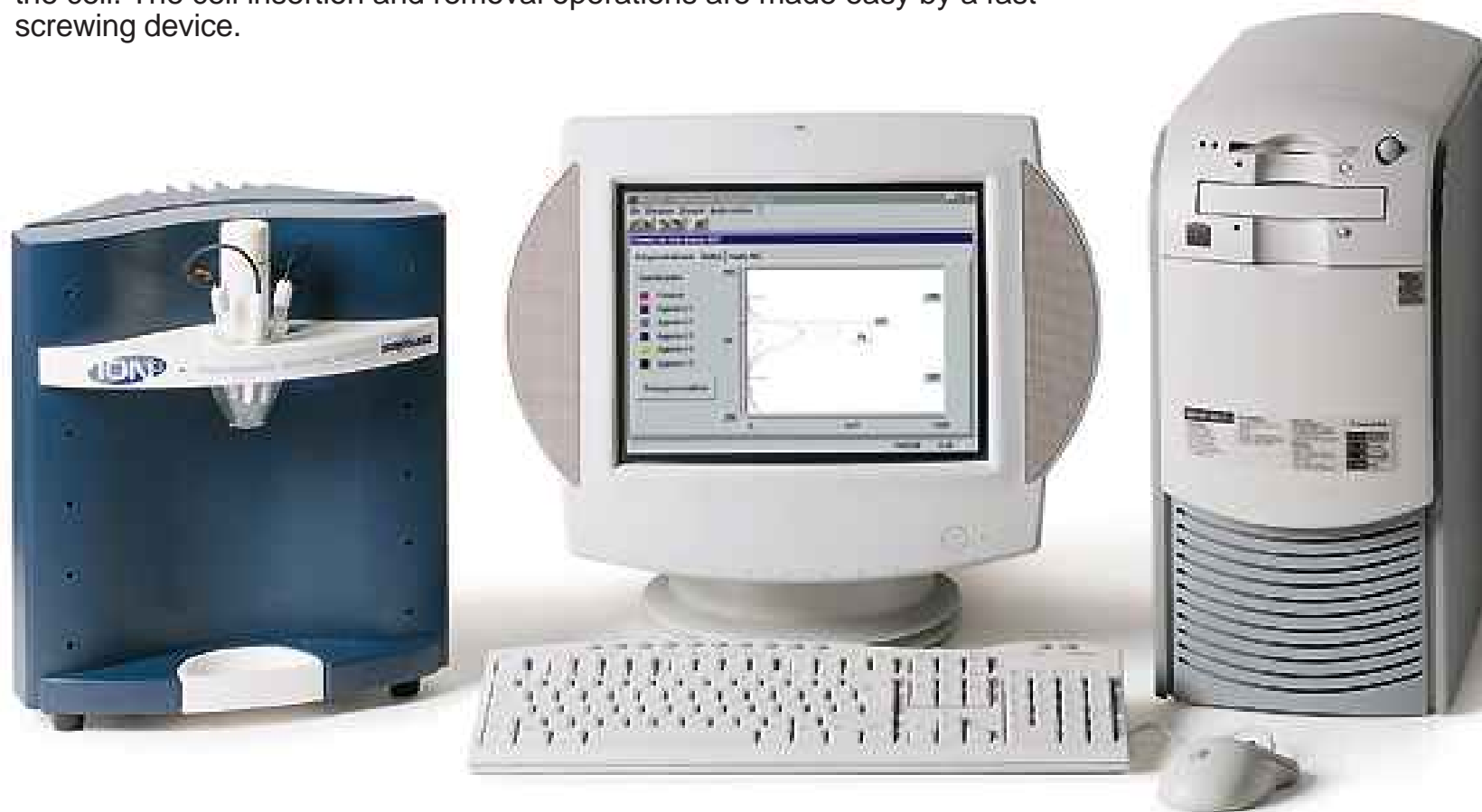
The control unit provides exact current and potential values so that to ensure high sensitivity, resolution and accuracy. The RS232 interface allows the connection with a personal computer, where the NEOTES Software has been installed to control the performance of the unit.

The NEOTES Software enables the user to easily approach STEROGLASS analytical applications of the potentiometric stripping technique.

While respecting the GLP rules, NEOTES allows to control the unit thoroughly and automatically performs all the mathematical elaboration needed to compute the unknown concentration of the metals that can be detected in the sample.

Furthermore, by this software, detailed reports on the performed analyses can be obtained, detected concentration can be statistically analyzed and the maintenance service can be planned while controlling the analytical performance as time elapses (control charts).

The procedures implemented by NEOTES allow to set and modify assisted and error-free analysis parameters (also by means of the examples provided by the help on-line).
The software is equipped with a standard Windows graphic interface and has been designed to fully exploit the potentiality of 32 bits operating systems and the new powerful microprocessors.

REMARKABLE FEATURES
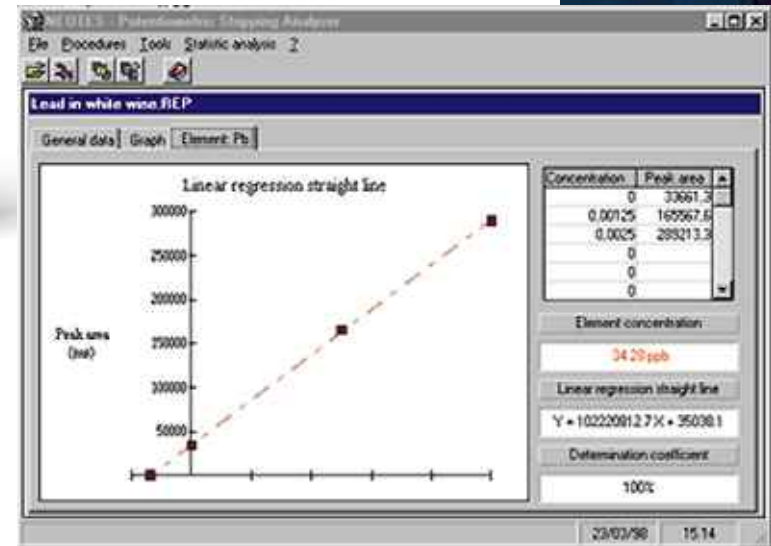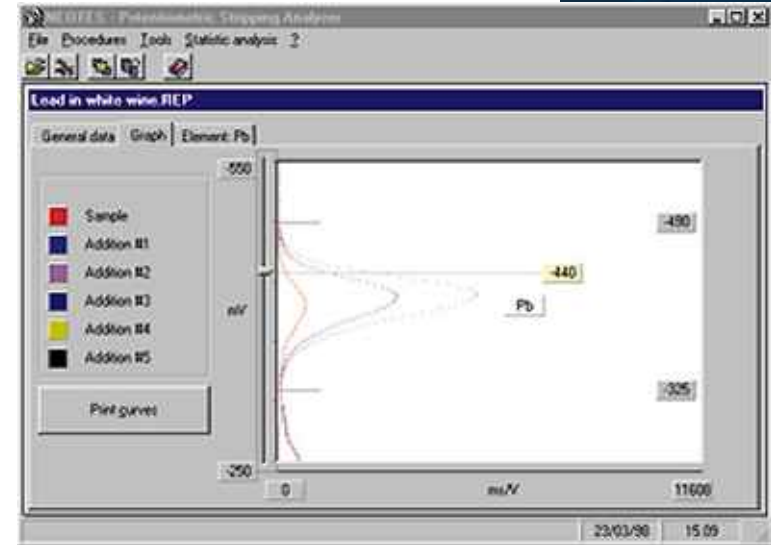
NON DESTRUCTIVE ANALYSES
ION^3 PSA allows to carry out several analyses on the same sample saving it every time: the recovery tests are optimal.

DETECTION IN CERTAIN MATRICES
ION^3 PSA allows the detection of several metals eliminating the sample intermediary treatment and mineralization phases in most liquid samples.

HIGH SENSITIVITY: AT ppb LEVEL
ION^3 PSA is particularly versatile for the detection of metals such as: Pb, Cd, Cu, Zn, As, Sb, Ni, Co, Mn, Hg, Se, etc…reaching sensitivity up to ppb.

QUICK ANALYSES
ION^3 PSA does not need conditioning time and gives analytical results in a few minutes. Analyses will be automatic by means of TYPE ONE Autoinjector.

USER-FRIENDLY
ION^3 PSA is user-friendly since the whole analysis can be automatically performed by means of a Personal Computer and NEOTES Software; a simple pre-set helps meet customer's personal analytical needs.

COMPETITIVE PRICE
ION^3 PSA has a very low price. The management costs are also very low.

WIDE RANGE OF APPLICATIONS
ION^3 PSA can be applied to the agro-alimentary, pollution, biological as well as clinical fields.

DEDICATED APPLICATION SOFTWARE
The application software can be provided in dedicated packages according to the field of interest.

VERY LOW MANAGEMENT COST
The management costs refer to consumption of the acidifying solutions (dosed in very little quantities), plating solutions and standard metal solutions.

SMALL SIZE
Its small size allows installation in very small spaces.

METAL-FREE
Disposable plastic metal-free cells prevent metal pollution coming from washing operations and glass cell.

General Specifications

Power Supply	115-230 Vac ±10% 40-60 Hz 30VA
Dimensions (WxLxH)	310 x 230 x 350 mm
Weight	8.5 Kg

Electrical Specifications

| 3 electrodes potentiostatic/galvanostatic system Current Ranges | Four current ranges from ± 100µA to ± 100nA auto-ranging |
| Resolution | 12 bit (referred to the full-scale value) |

Communication

| Interface | Opto-isolated RS 232 C 9 pin |

Cell System

Sample cell material	Borosilicate glass (PTFE available on request)
Stirrer	Computer controlled constant speed
Stirrer material	Borosilicate glass
Purging and blanketing system	Two-way automatic gas bubbler system

Electrodes

Type	8mm glass or PTFE-body with standard N6 conical joint
Reference Electrode	Ag – AgCl
Counter Electrode	Platinum wire
Working Electrode	Glassy carbon (V-10 grade)
Optional Working Electrodes	Gold and platinum

Minimum PC Requirements

Processor	Pentium® II 266MHz (Pentium® III advised)
System Memory	32 Mb or more
Hard-disk free space	About 20 megabyte
CD-ROM unit	32X or more
Serial Port	COM 1
Monitor	VGA monitor (640x480x16)
Printer	Any printer Windows™ compatible
Operating System	Microsoft® Windows™ 95 or NT 4.0 or upper

SOLUTIONS AND REAGENT KIT

DESCRIPTION

Kit standard plating for PSA 100 ml
Kit standard plating for PSA 250 ml
Kit plating for PSA (buffered condition) 100 ml
Kit plating Au for CCSA 100 ml
Kit Ultrapure water ASTM I (18.2 MOhm) 1000 ml
Kit KCI saturated for Ag/AgCI reference electrode 100 ml
Kit Cleaning Solution for electrodes 100 ml

CODE

SQPG012481
SQPG012483
SQPG012480
SQPG012464
SQPG012479
SQPG021831
SQPG021946

GENERAL DESCRIPTION

Autoinjector TYPE ONE

TYPE ONE Autoinjector is the standard automatic dosing system for Standard solutions suitable for heavy metals detections by means of ION^3 PSA. It is equipped with a syringe controlled by a high resolution step motor and screwed with a lead screw dice.

THANKS
TO TYPE ONE AUTOINJECTOR WE OBTAIN:

- Greater Accuracy and Precision compared to the Standard manual.
- Automatic Analyses after the sample preparation.
- Remarkable operator's time saving.

Syringe dimension and output speed

Volume	250 µl
Output speed	1-60
Model syringe	1725TLLX & 1725 DX

General specifications

Dimension	Width: 10.7 cm
	Height: 29 cm
	Length:
	20.2 cm from the frontal pannel
	21.7 cm from the syringe
Weight	1,4 kg without valve and sirynge
Power supply	24 VDC (+15%,-5%) with Max.1 A Max. 25 W

Communication

Interface	Opto-isolated RS 232 C 9 pin

Valve

Type	Series Hamilton HV, (easy assembly)
Material	Teflon® and fluid CTFE

Hardware configuration

Port	Serial port COM 2

ION³ • Potentiometr

STEROGLASS

DESCRIPTION	CODE
ION³ PSA (Potentiometric stripping analyzer) 220V	SQOR026031
ION³ PSA (Potentiometric stripping analyzer) 115V	SQOR028692
ION³ PLUS PSA	
Software NEOTES PLUS V 2.0 for ION³ PSA English version	SQQU021811

ACCESSORIES AND SPARE PARTS

Reference Ag/AgCl electrode	SQOU009253
Glassy graphite electrode	SQOU009252
Replacement tip for glassy graphite electrode (white side)	SQOU023761
Platinum electrode	SQOU009240
Moplen support for the electrodes	SQFY031021
Stirrer (without glass helix)	SQOU003395
Borosilicate glass Helix	SQOU009317
Borosilicate glass Sample Cell	SQOU006798
Plastic METAL-FREE Sample Cell (200 pieces)	SQOU006797
Arnite tap	SQOU023067
Anti-acid plastic bacin	SQOU025480
Double Cell desk support (Nylon ®)	SQFW017534

HARDWARE & CO.

Compatible Personal Computer (Pentium® III, Win98/Me/2000/XP, CD-ROM)	On request
Printer	On request
Printer cable Crown DB25M/C36M	CDDS006781
Serial adapter CROWN DB9M/DB25F	CDDS003265
Autoinjector TYPE I w/250µl (220 volt) for standard additions	SQOT004342
Autoinjector TYPE I w/250µl (115 volt) for standard additions	SQOT026221

STEROGLASS®

ION³

Potentiometric

Stripping

Analyzer

STEROGLASS®

SISTEMA QUALITÀ CERTIFICATO
UNI EN ISO 9001
SINCERT DNV