

# LABORATORIUMAPPARAT UUR



# Table of contents

|  |           |
|--|-----------|
| <b>BSI</b> .....   | <b>4</b>  |
| Gamma analysis software GammaPRO .....   | 6         |
| MONOLITH Gamma & X-ray HPGe Spectrometer .....   | 7         |
| Hybrid cooling for the HPGe detector Nicole .....  | 8         |
| HPGe Spectrometer with Lead Shield .....   | 9         |
| Robotic Gamma Spectrometer .....   | 10        |
| HPGe Spectrometer with Shield .....  | 12        |
| Flowing HPGe Spectrometer .....  | 14        |
| HPGe Infrared Detectors .....  | 15        |
| Ultra Low-background HPGe Detectors .....  | 16        |
| LN2 storage and transfer system .....  | 17        |
| Multi Channel Analyzer BOSON .....   | 18        |
| Digital Miniature Multi Channel Analyzer MCA 527 .....   | 19        |
| Quality Assurance package .....  | 20        |
| Free Release Monitor HERCULES-FRM .....  | 21        |
| Gamma-, beta- and alpha- spectrometer-radiometer TRIO .....                                    | 23        |
| <b>Else Nuclear</b> .....  | <b>23</b> |
| BSS – BONNER SPHERE SPECTROMETER .....   | 25        |
| SP2 – SINGLE-SPHERE NEUTRON SPECTROMETER .....   | 26        |
| W-PIE – WIDE ENERGY ACTIVE NEUTRON SPECTROMETER .....  | 27        |
| GSU – GAMMA SPECTROMETRY UNIT WITH NaI(Tl) .....   | 28        |
| SATURN I, SATURN II .....  | 29        |
| WDMS NT-VK .....   | 30        |
| LEM – LIQUID EFFLUENT MONITORING SYSTEM .....  | 31        |
| <b>Ludlum Measurements</b> .....   | <b>31</b> |
| Model 3030E Alpha-Beta Scaler .....  | 33        |
| Model 2000 General Purpose Scaler .....  | 34        |
| Model 2200 Scaler-Ratemeter .....  | 35        |
| Model 2100-1 Sample Counter .....  | 36        |
| Model 2100 ConveyORIZED Sample Counter .....   | 37        |
| Model 3030E with 43-10-1 Alpha-Beta Sample Counter .....                                       | 38        |
| Model 3030-2 Simultaneous Alpha-Beta Sample Counter .....                                      | 39        |
| Model 3030 Alpha-Beta Sample Counter .....   | 40        |
| Model 3030P Alpha-Beta Sample Counter .....  | 41        |
| Probes (Ludlum) .....  | 42        |
| <b>SDEC France</b> .....   | <b>42</b> |
| EDP 9002 – Double Mast Electrodeposition Equipment .....                                       | 45        |
| PRC 14: Maintenance Pump – For Cleaning Pipes for HAGUE 7000 CARBON 14 Bubbler .....           | 46        |
| MARC 7000 – Tritium Bubbler: Atmospheric Monitoring System with 4 Pots (With Oven) .....       | 47        |
| Aerosol and Iodine Sampling Heads .....  | 48        |
| AS 5000 Portable Aerosol & Iodine Sampler DPRC Type for Air Flow Regulation – Maintenance-Free |           |

|   |           |
|---|-----------|
| Design .....  | 49        |
| EDP 7000 – Electrodeposition Equipment – Monostation .....      | 50        |
| DPM 7001 Liquid Scintillation Counter – SDEC .....              | 51        |
| H3R 7000 Airborne Tritium Condenser – SDEC .....                | 52        |
| Single Mast Electrodeposition Equipment – EDP 7000 – SDEC ..... | 53        |
| Tritium sampler 4 vials MARC 7000 – SDEC .....                  | 54        |
| <b>Spectrum Techniques .....</b>                                | <b>54</b> |
| Advanced Spectroscopy System .....                              | 56        |
| SCINTILLATION WELL COUNTING SYSTEM .....                        | 57        |
| Intermediate Nuclear Laboratory System .....                    | 58        |
| <b>GEORADIS s.r.o. ....</b>                                     | <b>58</b> |
| RT-50 Laboratory Gamma-Ray Spectrometer – Georadis .....        | 60        |
| <b>Kromek .....</b>   | <b>60</b> |
| Quant GR1 .....   | 62        |
| <b>Ultra Electronics .....</b>                                  | <b>62</b> |
| CMS Iodine Monitor – Lab Impex Systems .....                    | 64        |



## Partner **BSI**

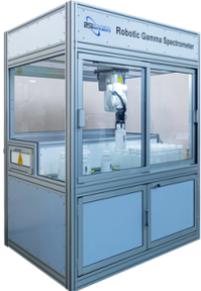


Baltic Scientific Instruments (BSI) is an OEM manufacturer based in Riga, Latvia, dedicated to the development and production of advanced spectrometric and detection equipment. With decades of experience and roots in the former Research Institute for Radioisotope Apparatus (RNIIRP), BSI provides cutting-edge technologies for nuclear power, environmental monitoring, security, medicine, and scientific research.

The company specializes in HPGe, Si, CdZnTe/CdTe, and scintillation detector systems, known for their accuracy, stability, and performance in demanding analytical environments.

Through continuous innovation, strict quality assurance (ISO 9001:2015), and strong international collaboration, BSI supports customers worldwide in achieving precise and reliable radiation measurement and analysis.

### Product offering

|  |  |  |  |
|--|--|--|--|
| <p><b>Gamma analysis software GammaPRO</b></p>  | <p><b>MONOLITH Gamma &amp; X-ray HPGe Spectrometer</b></p>  | <p><b>Hybrid cooling for the HPGe detector Nicole</b></p>  | <p><b>HPGe Spectrometer with Lead Shield</b></p>  |
| <p><b>Robotic Gamma Spectrometer</b></p>        | <p><b>HPGe Spectrometer with Shield</b></p>                 | <p><b>Flowing HPGe Spectrometer</b></p>                    | <p><b>HPGe Infrared Detectors</b></p>             |

**Ultra Low-background  
HPGe Detectors**



**LN2 storage and  
transfer system**



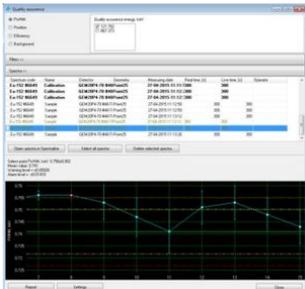
**Multi Channel  
Analyzer BOSON**



**Digital Miniature  
Multi Channel  
Analyzer MCA 527**



**Quality Assurance  
package**



**Free Release Monitor  
HERCULES-FRM**



**Gamma-, beta- and  
alpha-  
spectrometer-radiometer  
TRIO**



← [Back to partner](#)



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## Gamma analysis software GammaPRO

The software is intended to

- Control the spectrometric multichannel analyzer;
- Analyze the spectra acquired using scintillation and semiconductor gamma and beta detectors;
- Work with spectra modeled by the Monte Carlo simulation.



The matrix method enables automatic calculation of activity of a sample provided its radionuclide composition is known. The method is used for routine measurements of food, building materials, water and other substances subject for permanent radiological control.

The superposition method is mainly used for control of correctness of activity calculations in case of hard-to-analyse (multiple peak) low-resolution spectra (acquired by scintillation detectors). Such a tool enables visual estimate of the degree of similarity between an acquired and calculated spectrum. Additionally, calculation data can be adjusted until the spectra completely coincide.

The Software features an integrated system for report generation which provides automatic creation of measurement results. The settings for report generation can be adjusted by user.



## MONOLITH Gamma & X-ray HPGe Spectrometer

Detection unit Monolith consist from the following integrated components:

- HPGe detector
- Preamplifier
- Autonomous cooling system for the detector based on electrical machinery cooler EMC
- Controller for controlling the operation of EMC
- Fans (2-4) for EMC cooling



### Features

- 10% - 160% efficiency HPGe p-type coaxial detectors are available;
- Energy range from 40 keV to 10 MeV for GCD model;
- Energy range from 3 keV to 10 MeV for GCDX/GCDX-OS models;
- High efficiency of radiation detection;
- High energy rate up to 200000 MeV/sec;
- Excellent peak symmetry;
- Detection of radiation in any spatial orientation depending on cryostat modification;
- Manufacture in a portable cryostat is possible;
- Low background and Ultra - low background materials are available;
- Doesn't require a full thermal cycle after an unexpected shutdown.

← [Back to partner](#)



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## Hybrid cooling for the HPGe detector Nicole

The NICOLE hybrid cooling system combines liquid nitrogen and electro-mechanical cooling. The merge of this two cooling systems provide detection unit non-stop operation for months without having liquid nitrogen to refill.

The NICOLE hybrid cooling system comprises Stirling-cycle cryocooler, cryocooler controller, Dewar vessel, pressure sensor and indicator, liquid nitrogen sensor and level monitor.



### Application

Nicole hybrid cooling system for the HPGe detector allows you to keep your detector cold without filling with Liquid Nitrogen for months and years.

### Features

One of the biggest advantages of Nicole hybrid cooling system is that it is extremely easy to perform maintenance and service. The user is given USB interface to get access to all parameters of the system. Majority of main parameters are displayed of the LCD display. And I case of maintenance, repair or replacement of the cooler is needed, it takes only 15 minutes to dismantle the cooling unit. It means the user can continue measurements by only using liquid nitrogen. It can be extremely important when routine measurements can't be terminated.



## HPGe Spectrometer with Lead Shield

### Application

Coaxial HPGe Detector with Lead Shield is used to measure the specific gamma radiation of radionuclides from various types of environmental objects such as rocks, minerals, sludge, slag, soil, plant, sediment and particulate matter in air and water.

### Features

- Adopting precision gamma-spectrometry methods
- Radionuclide identification and determination of their specific activity
- Low level of instrumental background
- Low threshold for radionuclide detection
- Separate and simultaneous measurement of activity of 100 radionuclides



### DESCRIPTION

Coaxial HPGe Detector with Lead Shield is used to measure the specific gamma radiation of radionuclides from various types of environmental objects such as rocks, minerals, sludge, slag, soil, plant, sediment and particulate matter in air and water.

#### Ordering information

For LN2 cooled dipstick HPGe detection units:

- N100 - 100mm thick lead.
- N150 - 150mm thick lead.

For electrically cooled HPGe detection units (Monolith):

- M100 - 100mm thick lead.
- M150 - 150mm thick lead.

For hybrid cooled dipstick HPGe detection units (Nicole):

- H100 - 100mm thick lead.
- H150 - 150mm thick lead.



# Robotic Gamma Spectrometer

## Application

The Automated Spectrometer is intended for the detection and analysis of radio nuclides from various types of environmental objects such as rocks, minerals, sludge, slag, soil, plant, sediment and particulate matter in air and water. The spectrometric system is able to determine the composition of a sample based on the photon energy and the activity based on the photon flux. The low-background lead shielding together with the highly pure germanium (HPGe) p-type detector gives precise results even for low activity materials. The fully automated sample changer enables the user to measure more than 40 samples, without having to interact with the Robotic Gamma Spectrometer. This reliable robotic sample changer increases the productivity and reduces the possibility of health risks for the operator.



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The fully automated sample changer enables the user to measure more than 40 samples, without having to interact with the Robotic Gamma Spectrometer. This reliable robotic sample changer increases the productivity and reduces the possibility of health risks for the operator.

## Automatic Sample Changer

The seven-axis robot handles a payload of up to 3kg and with, practically, unlimited reach, the robot is able to carry out a series of operations using flexible rather than hard automated solutions. In addition to a horizontal reach, the robot has the ability to reach below its base. Furthermore, the robot has a very compact turning radius, which is enabled by the robots symmetric architecture, without offset on axis 2. This ensures the robot can be mounted close to other equipment.

## Basic characteristics of Robot arm:

- Seven-axis manipulator
- Machine vision
- Payload: 3 kg
- Reach: per request
- Fastest 7-axis robot
- Accuracy:  $\pm 0.01$  mm
- Weight: 25 kg
- IP30 protected

- All motors and cablings enclosed
- Compact controller
- Sample holder tool for vessels with diameter in range 40 - 110 mm.
- Barcode Reader and Writer

To assure the correct processing of all data during the measurement and analysis process, the samples are marked by using a barcode printer that is connected to the workstation. Here all necessary information about the sample is stored in a database. Using the bar code reader, the information stored in the database is retrieved for each sample before the measurement process is started. This fully automated process delivers all necessary information for the measurement and analysis process.



## HPGe Spectrometer with Shield

### Application

The spectrometer with shield is designed for defining the composition and activity of radionuclides in the flow of liquids and gases in automated technological processes in the nuclear power industry, environmental monitoring and in industrial applications involving radionuclides. The Spectrometer can be used for radiation monitoring and various tasks like definition of activity of naturally occurring radionuclides (NORM) in building materials, raw materials, foodstuff, industrial waste monitoring and technological radionuclide production and processing without sampling. The Spectrometer allows pre-setting algorithm of continuous and autonomous measurement in advanced to avoid interaction of employees with the Spectrometer and samples in case of remote installation or installation in restricted area. Complete control, monitoring, calibration and preventive maintenance of the Spectrometer is performed remotely by means of Ethernet interface or other available interfaces..



### Features

- Definition of composition and activity levels of radionuclides in real time mode
- Display of current values for specific activity of controlled radionuclides
- High registration efficiency
- Wide range of measured activities
- Operation rates in fully-automatic mode: measurement, washing, purging, pre - starting

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- Low activity samples

To get more statistics, the system is equipped with large diameter tube and might have several loops around the detector in order bigger amount of the sample was located around the detector for measurement.

The system is also capable to perform not only continuous measurement of sample flow but also to perform

sampling by stopping the flow for certain amount of time to get more time for acquisition.

- Low and middle activity samples

One loop tube can be used of sampling. Material of the tube can be acryl or glass.

- High activity samples

High activity samples can be brought the detector by using metal tube of relatively small diameter. Such kind of tubes can be used for measurement of hot liquid samples and high pressurized gas samples within reasonable limits.

Diameter and material of the tube is carefully determined during technical discussion with the user in order to consider of parameters of technological line and environmental conditions.

Depending on the application, other sample vessels are available to be used instead of sample tube. Acryl or metal Marinelli-type vessels. Example is below:



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# Flowing HPGe Spectrometer

### Application

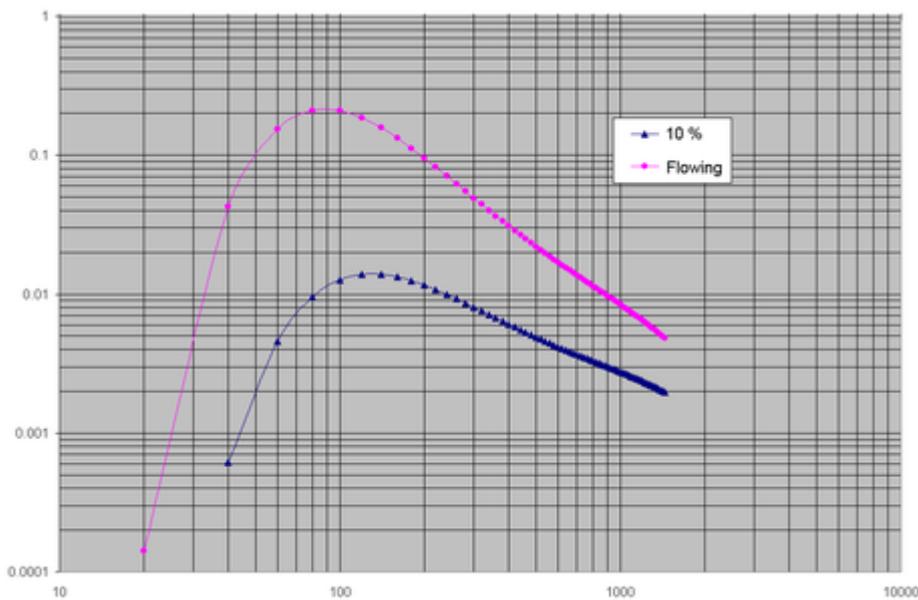
Highly efficient control of radionuclide materials with low activity.

### Features

Detection unit performs  $4\pi$  geometry measurements as measuring product is moving inside germanium detector. Radionuclide efficiency registration is more than an order of magnitude higher than efficiency registration of standard coaxial detection unit of the same dimensions.



HPGe detector flowing geometry can be developed based on the crystal with equivalent efficiency from 10 to 100%.



Absolute efficiency registration comparison curves during gamma-ray emission with sample positioning inside and outside detector.

← [Back to partner](#)



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## HPGe Infrared Detectors

### Application

High sensitive HPGe infrared detectors are intended for NIR Fluorescence or Raman spectroscopy and similar applications in spectral region from 850 nm to 1.7  $\mu\text{m}$ .



### Features

- Highest sensitivity
- Low noise level
- Frequency range up to 300 Hz
- LN2 cooled electronic input stage (FET and feedback resistor)
- RG 850 window with antireflective coating
- Preamplifier with temperature monitor
- Various types of Dewar vessel are available

HPGe infrared detectors are intended for NIR Fluorescence or Raman spectroscopy and similar applications in spectral region from 850 nm to 1.7  $\mu\text{m}$ .



# Ultra Low-background HPGe Detectors

## Application

Ultra low-background HPGe detectors are widely used in underground laboratories for determination of radionuclides activities in environmental or industrial samples at  $\mu\text{Bq/kg}$  levels and in scientific experiments such as investigation of magnetic moment of neutrino, dark matter search, etc.



## Design

- Task related design (U-type, vertical, down-looking or portable cryostat)
- Remote not cooled part of preamplifier
- Zeolite is placed near not cooled part of preamplifier in order to be outside measuring chamber

## Cryostat materials

- Certified materials with low radiation impurities
- Ultrapure aluminium-silicon alloy with U + Th content < 1, 0.5 or 0.2 ppb for detector holder and endcap
- Freshly produced electrolytic copper for coldfinger and pedestal
- Tested on radiopurity selected stainless steel screws and sapphire insulators

## Technology

- Transportation of HPGe crystal and cryostat materials by surface freight
- Minimization of fabrication time (location of materials above ground)
- Assembly in a cleanroom
- Cleaning and passivation of copper surfaces
- Storage of crystal and cryostat materials in a container made from materials effectively slowing down and absorbing neutrons (water and Cd)

## Design features

- Fabrication of large volume HPGe detectors without bulletization
- Front end electronics made on low-background Teflon substrate
- Passive screen between front end electronics and HPGe crystal made from Pb with Bi-210 radioactivity < 0.1 Bq/kg
- Double-crystal HPGe detector design
- Multi-crystal HPGe detector design

← [Back to partner](#)



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## LN2 storage and transfer system

### Application

The system for storage and transportation of liquid nitrogen in the following areas of application: Industrial, laboratories, life sciences, medical, etc.



### Features

- Direct liquid nitrogen supply with the decanting valve
- The LN2 System can fit easily under a laboratory bench or workstation
- A hand rail can be easily attached to protect the operating head and make it easier to move the vessel
- Easy to dispense liquid nitrogen
- Double valve option for liquid use
- Capacity of 35 to 100 litres
- Self-pressurized vessel
- Delivered with or without the operating head
- Static holding time up to 75 days
- 6 year guarantee on the vacuum



## Multi Channel Analyzer BOSON

### Features

- Boson MCA acquires and displays spectra with overlapping by energy range up to 1000 times
- No resolution deterioration at operation in the beginning of spectrum energy range
- Stable operation with preamplifiers of TPR type with output voltage swing up to +/- 10 V and reset duration up to 250 us
- Automated P/Z adjustment
- Improved dead time correction
- Spectrum stabilization
- Setting and control of all parameters using colour LCD display with touch screen
- Complete remote control of Boson MCA via software from PC
- Dead time correction
- Base Line Restorer (BLR)
- Operation with preamplifier TPR



All settings are saved in spectrometer memory in case of power supply disconnection.

Basic settings:

- HV ON and OFF
- HV polarity switching
- HV value setting
- Input signal polarity switching
- Amplification coefficient setting coarse (in analogue section)
- Amplification coefficient setting smooth (in analogue section)
- P/Z compensation adjustment with optimal adjustment indication
- ADC capacity switching 1024 / 2048 / 4096 / 8192 / 16384
- Discrimination threshold value setting of "fast" channel (CRM) in conventional unit, in the range of 0 - 30% of dynamic range (by amplitude of output signal on "LIN OUT")
- Discrimination threshold value setting of low signal level (LLD) in the channels, in the range of 0 - 50% of dynamic range (by amplitude of output signal on "LIN OUT")
- Discrimination threshold level setting of high signal level (HLD) in the channels, in the range of 50 - 100% of dynamic range (by amplitude of output signal on "LIN OUT")
- Shaping time constant switching
- Basic line restoration time switching (8 values)
- Dead time correction
- Spectrum acquisition time setting
- Spectrum acquisition ON and OFF
- Switching of communication port with the outer computer: USB, LAN, RS-232



# Digital Miniature Multi Channel Analyzer MCA 527

The MCA527 is a battery powered high performance 16K Multi-Channel Analyzer/Multi-Channel Scaler module with the performance of a laboratory grade MCA. High voltage supply for detector and preamplifier power supply are integrated as well as an internal coarse amplifier and digital filtering and analysis. Together with a detector it forms a small-size gamma spectroscopy system, which is well suited to the demands of field measurements for international safeguards, environmental monitoring, nuclear waste treatment facilities, radioactive transport control and similar applications.



- Automated base line restorer and threshold adjustment
- Automated or manual pole zero adjustment without oscilloscope
- System dead time and count rate indication
- Dead time correction
- Automated spectrum recording
- Peak stabilization
- Basic analysis functions (energy calibration, FWHM, peak area and integral calculations, spectrum stripping and smoothing)
- File menu: write/read functions with drive/path – and file pick list functions
- Setup menu: ADC, Amplifier, Presets, Memory splitting, MCA mode, MCS mode, Multi spectral recording mode, automated instrument configuration using setup file
- Analysis menu: Energy calibration und further analysis functions defined according the purpose. Energy calibration with linear calibration curve using 2 peaks or energy channel pairs
- Acquire control: Start, Stop, Erase, Presets Incorporated Help texts Print screen for print via system printer (Windows) quick documentation
- Display functions: Automated vertical full scale (VFS), manual and logarithmic VFS, cursor functions, expand and unexpand, ROI setting
- Detection limit formalism: more than 17

← Back to partner



## Stralingsdetectie > Laboratoriumapparatuur Quality Assurance package

Gamma or Alpha analysis software SpectraLine can be extended with Quality Assurance package in order to provide monitoring of the spectrometer channel for the parameters of the full energy peak (position, FWHM and detection efficiency) for the specified energy and the background count rate.



The reference sample and the background are measured in semi-automatic mode for quality control. As the scenarios are used the measurement parameters can be flexibly adjusted and the monitoring results can be displayed depending on the date and time of the measurement start.

The control limits determined by the alarm and warning levels are displayed on the graph, so the parameters deviation from the specified intervals can be easily found.



## Free Release Monitor HERCULES-FRM

### Application

Free Release Monitor HERCULES-FRM main working principle can be described the following way. Any loading mechanism like forklift or a crane gently puts measuring object to the movable platform on the front roller-based conveyor. Scales which are inbuilt in the front conveyor are determining weight of the measuring object and automatically transfers information for the analytical software. Further actions are performed totally automatically or in manual mode. Measuring chamber opens front doors and movable platform slides inside of measuring chamber. Doors are closed and measurement starts. The FRM is equipped with 16 plastic scintillators surrounding the measuring object from all sides. Plastic scintillators are connected to digital multichannel analysers located in the control box. Analytical and control software packages guarantee total remote control and data acquisition from all plastic scintillators simultaneously. All analytical performance of the FRM is set up previously by inputting all information concerning measuring object, geometry, sizes, weights, filling of containers, etc. in the software package. After measurement is finished, operator is alarmed, record is stored in the database and report can be printed any time. In order to change the measuring object, the FRM opens the front doors and slides the platform out for further unload by the forklift or a crane. In case the operator needs to measure specific object, it is possible to open back doors to load the measuring object from the back. The whole measuring chamber is securely covered with stainless-steel for easy decontamination.



### Features

#### General

- Overall dimensions of the FRM: 5000x2300x2100mm (LxWxH)
- Overall weight of the FRM: 10000kg
- Operation temperature: +10...+35°C
- Ready to accommodate object with size 1.2m x 0.8m x 1.0m (L x W x H)
- Lead walls not less than 50mm thick
- Stain-less steel protection
- External and internal automatic conveyor
- Inbuilt scales

### **Plastic scintillators (HPGe detectors optional)**

- 16 or 24 or more plastic scintillators equipped with PMTs
- Energy range from 100 to 3000 keV
- Detection limit for Co-60 is less than 300 Bq

### **Software**

- Total activity calculation
- Visualization of measurement and diagnostic information
- Storage of measurement data, controlled parameters and fixed constants in internal memory
- Control of all mechanically movable mechanisms
- Control and reset of the FRM in case of failure of automation
- Self-diagnostics control
- Visual and audible alarm in case of failure or exceed of previously set levels
- Alarm in case of fixed level activity exceed for separately chosen radionuclide
- 3D visualization interface for measurement object monitoring and setting geometrical parameters in order to decrease measurement uncertainties
- Visualization of inhomogeneities in activity distribution
- Automatic change of measurement parameters depending on measurement geometry (Geometry must be set up preliminary)
- All software packages run under Windows operation system

**Control box** Control box of the FRM includes the following components:

- Set of MCAs for reading and transforming signals from PMTs of plastic scintillators
- Set of power supplies for different modules of the FRM
- Set of controllers to manage all components of automation process
- Indicators for operator
- Control panel with colour LCD display and touchscreen
- An emergency stop button is provided on the control box and the measuring chamber



# Gamma-, beta- and alpha-spectrometer-radiometer TRIO

## Application

Spectrometer TRIO is designed for registration of gamma-, beta- and alpha radiation and for measuring activity (specific and volumetric activity) of natural radionuclides (for example Ra-226, Th-232, K-40, Rn-222), technogenic radionuclides (for example Cs-137, Cs-134, Co-60, mTc-99, Sr-90 and etc.) in water, food, vegetation, building materials, soil samples, radiopharmaceuticals, rocks, chemical industry materials, alloys, scrap metal and other technological products. Also, it is used for measuring gross specific activity of beta- and alpha-emitting radionuclides in water.



## Features

- Ability to manage several channels simultaneously
- Intuitive and user-friendly software
- Low Power Consumption
- Compact size of each chamber
- Free to choose channels of your interest depending on application
- Easy extension of channel quantity
- 100% remote control of the spectrometer TRIO via software package



## Partner **Else Nuclear**



ELSE NUCLEAR S.r.l. is an Italian OEM company specializing in advanced radiation-detection and environmental-monitoring systems for nuclear safety, industry and research.

### Product offering

**BSS - BONNER  
SPHERE  
SPECTROMETER**



**SP2 - SINGLE-SPHERE  
NEUTRON  
SPECTROMETER**



**W-PIE - WIDE ENERGY  
ACTIVE NEUTRON  
SPECTROMETER**



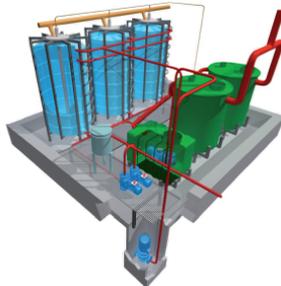
**GSU - GAMMA  
SPECTROMETRY UNIT  
WITH NaI(Tl)**



**SATURN I, SATURN II**



**WDMS NT-VK**



**LEM - LIQUID  
EFFLUENT  
MONITORING SYSTEM**





## BSS - BONNER SPHERE SPECTROMETER

The Bonner Sphere Spectrometer consists of an array of He-3 proportional counter thermal neutron detectors, each housed in a spherical HDPE moderator of different diameters.

BSS is proposed in two main configurations, adjustable according to the requirements, for single or multiple detectors.

An unfolding software (RUFUS), used to calculate the neutron spectrum, is also available for both configurations.



Each proportional counter is connected to a compact electronic module (2.5 cm diam. x 7.6 cm), providing:

- Precision wide-band charge-sensitive pre-amplifier and amplifier
- Discriminator circuit
- High voltage adjustment 0-2200 V
- Amplifier gain and discriminator threshold adjustment
- Analogue test points for shaped signals and HV

A user-friendly dedicated acquisition software can be installed on the PC managing the BSS, allowing the user to start and stop the measurements, to modify the parameters and to visualize the saved data.

The BSS standard set, designed to cover the neutron energy range from 1 meV to < 100 MeV, includes the following HDPE moderators: Ø 3", Ø 3.5", Ø 4", Ø 4.5", Ø 5", Ø 6", Ø 7", Ø 8", Ø 10", Ø 12", Ø 15", Ø 18".

The available configurations of BSS are:

- Single detector: includes only one He-3 proportional counter, to be inserted in one moderator sphere at a time. The detector is managed by a Counter Module and the user interface is the "Single counter" software.
- Multiple detectors: includes up to 16 He-3 proportional counters, and up to 16 moderator spheres (12 standard + 4 accessory), to be employed at the same time. The detectors are managed by a Datalogger and the user interface is the "DLOG" software.



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## SP2 - SINGLE-SPHERE NEUTRON SPECTROMETER

The single-sphere neutron spectrometer SP2 is a unique device that allows performing active neutron spectrometry measurements by employing a single instrument instead of the usual multi-sphere BSS.



SP2 is characterized by the same high sensitivity and precision as BSS in determining the neutron flux over the entire energy range, while removing any reproducibility uncertainty. When employed with the on-line unfolding tool, SP2 can also perform real time measurements.

SP2 is equipped with 32 active  $^6\text{LiF}$ -covered Silicon neutron detectors installed over six concentric layers inside the moderating assembly, so that they reproduce the spectrometric performance of a six-sphere BSS. The signals are acquired by the built-in electronics and can be either analysed on-line by the built-in unfolding algorithm, or saved as raw data for off-line analysis.

SP2 can be used in a great number of activities in scientific research: homeland security, cargo inspections, calibration laboratories, characterization of stray radiation fields for radiation protection purposes, periodical quality check of the neutron stray radiation field, all applications involving the need of a fast and precise measurement of the neutron spectrum.

A SP2 LITE version is also available, featuring a lighter build and a narrower energy range, suitable for all the applications that do not require to detect neutrons with energy above 20 MeV.

The response function of the device, calculated via Monte Carlo simulations, is available for either on-line and off-line analysis. The response function and unfolding algorithm have been validated after thoroughly testing with reference radioactive sources.

SP2 is the ideal device for performing active neutron spectrum measurements in every radiation environment, including mixed stray radiation fields, workplaces characterized by high gamma background and reference calibration laboratories.



## W-PIE - WIDE ENERGY ACTIVE NEUTRON SPECTROMETER

The W-PIE neutron spectrometer is a unique device designed for on-line neutron spectrometry measurements. The system features an extremely high counting efficiency, making it suitable to perform neutron spectrometry and absolute flux measurement for applications such as:

- homeland security
- cargo inspections
- calibration laboratories
- background suppression in high-energy physics experiments
- cosmic ray neutron sensing (CRNS) in agriculture
- snow water equivalent (SWE) measurements in hydrology



W-PIE employs  $^6\text{Li}$  as neutron converter,  $^4\text{He}$  as scintillating medium, and 24 independent low-voltage SiPMs as photosensitive components. The detector is surrounded by increasingly thick moderating assemblies, defining 4 detection sub-volumes each optimised for a specific spectral region. Signals are acquired and analysed by the built-in electronics and unfolding algorithm, or they can be saved as raw data for off-line analysis.

The response function of W-PIE, calculated via Monte Carlo simulations, is available for either on-line and off-line analysis. The response function and unfolding algorithm have been validated after thoroughly testing with reference radioactive sources, with quasi-monoenergetic neutron fields, and in the high-energy reference neutron field facility CERF at CERN.

The device is available in two configurations:

- W-PIE - standard, high-energy version, with Cd and Pb inserts, designed to be sensitive to neutrons up to 10 GeV
- HERMES W-PIE - lightweight and standalone low energy version, without high-Z inserts, designed to be sensitive to neutrons up to about 100 MeV

The W-PIE version is powered over Ethernet and communicates with a PC through Ethernet connection.

The HERMES W-PIE version is a standalone unit featuring a single board computer, a 4G router, a GPS and a dual-SIM system allowing remote control.



## GSU - GAMMA SPECTROMETRY UNIT WITH NaI(Tl)

The GSU gamma spectrometry units employ a 3"x3" NaI(Tl) crystal coupled to a photosensitive detector (either PMT or SiPM) and an MCA. The detector is installed in a 5 cm thick lead shielding well, with additional inner layers of tin and copper for enhanced background reduction.

GSU is designed to perform gamma spectrometry analyses of small samples, such as foundry casting samples, air particulate filters, environmental samples (rocks, soil, biological samples), positioned in sample holders which can be tailored to meet specific measurement requirements, or Marinelli beakers.



The User can manage the system through the proprietary ELSE NUCLEAR GSU system software, calculating the specific activity and the Minimum Detectable Concentration (MDC) of the sample expressed in Bq/kg, Bq/l, Bq/m<sup>3</sup>, etc. The built-in background subtraction subroutine improves the MDC without increasing the measurement time. The software includes fully-customisable isotope libraries as well as User-settable isotope-specific activity alarm thresholds, available through password-protected functions.

The GSU-NORM is a special version of system specifically conceived to perform Naturally Occurring Radioactive Material (NORM) analysis of environmental samples, such as rocks, sediments or soils. Through its MCA and its dedicated software, the GSU-NORM system allows determining the specific activity of NORM isotopes, i.e. K-40, Th-232 and U-238, expressed in Bq/g, %K, ppm eU and ppm eTh.

The sample holders are custom-made supports that fit directly on the detector's head, used to hold casting samples, test sources or other similar objects.

The Marinelli beakers are used to contain geological samples or other similar materials. Several volumes are available, from 250 ml up to 1 l, with different geometrical features.

Each GSU system includes efficiency curves and coefficients implemented in the analysis software, calculated through Monte Carlo simulations for each specific configuration, acquisition chain and measurement geometry. The simulations are always validated through experimental tests performed with reference radioactive sources.



## SATURN I, SATURN II

The SATURN ratemeter is a compact acquisition and control unit, designed for managing and processing signals from any ELSE NUCLEAR connected detector.

- SATURN I: standard wall-mounted version
- SATURN II: wall-mounting version compliant with “Good Manufacturing Practice” requirements (no external cable or connectors)



All the ratemeter versions feature local function buttons with status LEDs, internal acoustic buzzer and a relay connector, used to manage external alarm columns or interlocks.

The SATURN ratemeter continuously acquires and processes the data coming from the connected detector, and compares results with user-defined alarm thresholds.

Two user-selected measurements can be displayed at the same time on the display, such as instantaneous or average count rate, dose rate, activity concentration, counts, dose or activity integrated values.

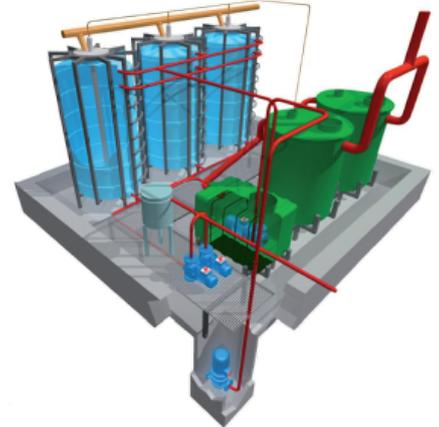
The user interface is accessible through an external keyboard, which allows local interaction with the full range of parameters (advanced setting is password protected). Measurements, thresholds and operating parameters are stored into an internal, non-volatile memory.

The ratemeter can communicate to and be remotely managed by a host PC through an Ethernet or RS485 network.



## WDMS NT-VK

The WDMS NT-VK system is designed to collect and monitor radioactive wastewaters, which can be released only after their radioactivity drops below a defined value. The main application of such a system is related to diagnostic and therapeutic procedures involving radioactive substances, and their partial elimination through the patient's metabolism.



The WDMS NT-VK system is designed to collect and monitor radioactive wastewaters, which can be released only after their radioactivity drops below a defined value. The main application of such a system is related to diagnostic and therapeutic procedures involving radioactive substances, and their partial elimination through the patient's metabolism.

The WDMS NT-VK main components are:

- Purification group: Imhoff tanks designed to collect the wastewaters and to separate liquid from solid waste
- Sorting group: pumps and conduits pouring the wastewaters in the decay tanks
- Decay group: tanks array where the wastewaters are poured and stocked until their radioactive level drops below a defined value
- Sampling system: valves and pumps used by the system to wash the sampling circuit and to sample the stocked wastewaters, allowing the measurement in Marinelli geometry
- Release group: pumps and conduits releasing the wastewaters in the sewers, if allowed by the monitoring results
- Safety groups and devices: level and pump sensors installed in all the system critical stages, stopping the wastewaters flow in case of detected anomaly, and safety flooding well which can collect and stock wastewaters potentially overflowing from any system group

The entire system is locally managed by a PLC, which is commanded by a remote management software installed on a PC.

Through the interactive synoptic interface of the software the operator can activate the system automatic cycles, set the measurement parameters, visualize the alarms and release archives, and monitor the system's status (filling levels, pump stages, measurements, alarms). Depending on the measurement results, and as defined by the procedures in force, the operator can also activate the monitored wastewaters release in the sewers.



## LEM - LIQUID EFFLUENT MONITORING SYSTEM

The LEM system is designed to sample the liquid effluents and to perform a spectroscopic analysis in Marinelli geometry.

LEM system is composed of the following main parts:

- Stainless steel frame
- Electrical and command board with touch-screen panel PC
- NaI(Tl) detector, 1 l Marinelli, 5 cm thick lead shielding well
- Self-priming pump (\*)
- Software for system management, data acquisition and processing



The measurements are visualised in real time by the software, expressed in terms of specific/total activity through spectroscopic analysis.

LEM status and parameters are managed by the ELSE NUCLEAR software. The system provides also I/O contacts through dedicated connectors:

- Good functioning status output
- Alarm status output
- Pump activation input from customer PLC (\*)
- Spare available I/O contacts (to be defined when necessary)

The software provides a calibration routine, to be used with a Marinelli calibration source (available as accessory).

A test program is also available, separate from the main application, to be used for maintenance or periodical quality controls.

(\*) If not available in the sampling/hydraulic equipment which LEM shall be connected to



## Partner Ludlum Measurements



Ludlum Measurements, Inc. is een vertrouwde wereldwijde leverancier van instrumenten voor stralingsdetectie en -monitoring en biedt robuuste, nauwkeurige oplossingen voor personeelsveiligheid, milieubescherming en beveiligingsscreening. Sinds 1962 wordt hun apparatuur wereldwijd gebruikt in toepassingen variërend van kernenergie en noodhulp tot grensbewaking en monitoring van kritieke infrastructuur.

### Product offering

**Model 3030E Alpha-Beta Scaler**



**Model 2000 General Purpose Scaler**



**Model 2200 Scaler-Ratemeter**



**Model 2100-1 Sample Counter**



**Model 2100 Conveyorized Sample Counter**



**Model 3030E with 43-10-1 Alpha-Beta Sample Counter**



**Model 3030-2 Simultaneous Alpha-Beta Sample Counter**



**Model 3030 Alpha-Beta Sample Counter**



**Model 3030P Alpha-Beta Sample Counter**



**Probes (Ludlum)**





## Model 3030E Alpha-Beta Scaler

- Dual Channel Scaler with Independent Readouts
- Connects to External Sample Head/Detector
- CPM & DPM Modes
- Background Subtraction
- Alpha/Beta Alarms
- QC Check
- 8 Hour Battery Operation
- Real Time Clock
- RS-232 Interface
- Includes PC Software



The Model 3030E is a dual channel, scaler-type, sample counter electronics package that will accommodate many detector inputs from external sample head/detectors. This design represents a significant improvement over older analog type scalers by providing greater utility and functionality.

The system incorporates independent backlit LCD readouts to support discriminated alpha and beta sample counting. The system features background subtraction, crosstalk correction, separate alpha/beta alarms, cpm/dpm operating modes, and a pre-scripted QC function with an automatic reminder timer.

The instrument supports both 110 and 220 Vac operation and includes a trickle-charged gel-cell battery for portable offsite use up to eight hours. A wide-range, high-voltage power supply supports virtually any detector.

Status indicators located along the front panel inform the operator when another QC check is required, if the detector is nonfunctional, if it is operating in DPM or CPM mode, and if either an alpha or beta alarm setpoint has been exceeded. The count time is selected via a front panel rotary switch that enables count times ranging from 0.1 to 60 minutes or some other prescribed value as set up via a link to a PC. Other controls include a start count button, audio volume rotary adjustment, and instrument on/off switch.

An RS-232 output from the rear panel supports connection to either a printer or PC. Included in the price is PC control software, which is a Windows application that supports setup of the system, as well as collecting and logging all count results from the 3030E.



## Model 2000 General Purpose Scaler

- General Purpose Scaler
- Supports Wide Range of External Detectors
- 95 to 250 Vac Power Input
- Portable Battery Operation
- RS-232 Interface to Printer or PC

The Model 2000 is a general purpose scaler typically used for counting samples. Rugged design and construction accommodates both benchtop and portable applications. The wide-ranging AC power supply and internal batteries are capable of powering the instrument upwards of 120 hours. The Model 2000 supports GM, proportional, and scintillator type detectors, and provides fine adjustment controls for setting the high-voltage and threshold settings.

The scaler reading is presented on a digital, six-digit readout LED that can be set to count from 0.1 to 999 minutes via a front-panel dip switch. An internal switch facilitates counting in seconds rather than minutes, if desired. Other front-panel controls include a start-count button, an HV/Bat switch for displaying the current value on the accompanying analog meter, and a three-way switch for selecting Power Off, Battery, or Line Power.

An RS-232 port on the rear panel allows connection to a PC or printer as set by a rear mounted switch (a RS-232 to USB adapter cable is included). When connected to a PC, the counting may be controlled and results recorded via application software.





## Model 2200 Scaler-Ratemeter

- General Purpose Scaler/Ratemeter
- Single Channel Analyzer
- Supports Wide Range of External Detectors
- 95 to 250 Vac Power Input
- Portable Battery Operation
- RS-232 Interface to Printer or PC

The Model 2200 is a general purpose scaler with an accompanying ratemeter, and is typically used for counting samples. Its rugged design and construction allow both benchtop and portable applications. The wide-ranging AC power supply and internal batteries are capable of powering the instrument upwards of 120 hours. The Model 2200 supports GM, proportional, and scintillator-type detectors, and provides fine adjustment controls for setting the high-voltage and threshold settings.

An adjustable discriminator and an adjustable window allow the user to count pulses within a user specified energy range. This portable unit can be powered by wall current or by four "D" cell batteries. The latter allows for continued operations during power interruptions. An optional printer (Model 4167-386) is available for hard copy archival of wipe test results.

The Ludlum Model 2200 Scaler/Ratemeter is the ideal economic solution for routine sample counting, single channel analyzing and routine radiopharmaceutical related procedures, when used with the [Model 243](#) well scintillator (NaI) detector. The well counter's  $4\pi$  geometry and 1.3 cm (0.5 in.) shielding provides excellent sensitivity to higher energy isotopes like  $^{131}\text{I}$ .



← **Back to partner**



**Stralingsdetectie > Afval- en recyclingbeheer**

## **Model 2100-1 Sample Counter**

The Model 2100-1 manually operated sample counting system processes sample steel slugs to determine whether any radioactive impurities exist. The gamma radiation counting system is a table-mounted, fully integrated design that includes a gamma detector, sample tray, and controller.

The counting electronics incorporates two channels to distinguish between low and high energy gamma isotopes. All parameters, such as alarm point and count time are user-adjustable from the front panel LCD touch screen via a simple menu selection.

Measurement results for each sample are displayed on the backlit LCD. An Ethernet port reports all results and system status in real time for remote data logging and alarm annunciation. Visual and audible alarms are annunciated via the system's LCD and rear panel mounted buzzer respectively. A built-in relay provides a method for driving an external horn/strobe (available as an option).

One rear panel mounted USB port enables connection to either a keyboard or barcode reader device for the purpose of entering sample IDs.

### **Features**

- High Sensitivity Gamma Detector
- Separate High & Low Gamma Energy Sampling
- User-Adjustable Parameters
- Color LCD Touch Screen
- Ethernet Connectivity
- Remote Alarm Output
- USB Ports for ID Input Devices





## Model 2100 ConveyORIZED Sample Counter

The Model 2100 automated sample counting system processes sample steel slugs to determine whether any radioactive impurities exist. The gamma radiation counting system is a table-mounted, fully integrated design that includes a gamma detector, sample conveyor, and controller to facilitate automated processing.

Once the sample has been positioned on the conveyor, an infrared sensor automatically initiates conveyance of the sample into the lead shielded detector where it is counted for a predetermined time. Once the count is completed, the conveyor again advances until the sample drops into a discard container.

The counting electronics incorporates two channels to distinguish between low and high energy gamma isotopes. All parameters, such as alarm point and count time are user-adjustable from the front panel LCD touch screen via a simple menu selection.

Measurement results for each sample are displayed on the backlit LCD. An Ethernet port reports all results and system status in real time for remote data logging and alarm annunciation. Visual and audible alarms are annunciated via the system's LCD and rear panel mounted buzzer respectively. A built-in relay provides a method for driving an external horn/strobe (available as an option).

One rear panel mounted USB port enables connection to either a keyboard or barcode reader device for the purpose of entering sample IDs.





Stralingsdetectie > Laboratoriumapparatuur

## Model 3030E with 43-10-1 Alpha-Beta Sample Counter

- Alpha-Beta Dual Channel Sample Counter
- Simultaneous Alpha & Beta Counting
- 5.1 cm (2 in.) Diameter Sample Tray
- Independent Readouts
- CPM & DPM Modes
- Background Subtraction
- Alpha/Beta Alarms
- QC Check
- 8-Hour Battery Operation
- Real Time Clock
- RS-232 Interface
- Includes PC Software



This system joins Ludlum's Model 3030E dual channel scaler and the [Model 43-10-1](#) dual phosphor detector with a 5.1 cm (2 in.) diameter sample tray to produce a complete alpha beta sample counting system. The 3030E electronics incorporates independent backlit LCD readouts to support discriminated alpha and beta sample counting. The system features background subtraction, crosstalk correction, separate alpha/beta alarms, CPM/DPM operating modes, and a pre-scripted QC function with automatic reminder timer.

The instrument supports both 110 and 220 Vac operation and includes a trickle-charged gel-cell battery for portable offsite use for up to eight hours. A wide-range high-voltage power supply supports virtually any detector. Status indicators located along the front panel inform the operator when another QC check is required, if the detector is nonfunctional, if it is operating in DPM or CPM mode, and if either an alpha or beta alarm setpoint has been exceeded.



# Model 3030-2 Simultaneous Alpha-Beta Sample Counter

- Fully Integrated Alpha-Beta Sample Counter
- Simultaneous Alpha and Beta Counting
- Shielded 5.1 cm (2 in.) Diameter Sample Tray
- Independent Readouts
- CPM, Bq, & CPS Modes
- Background Subtraction
- Alpha/Beta Alarms
- QC Check
- 8 Hour Battery Operation
- Real Time Clock
- RS-232 Interface



The Model 3030-2 Simultaneous Alpha-Beta Sample Counter is a dual-channel counter designed for simultaneous alpha and beta sample measurement.

The counts per minute (CPM), Becquerel (Bq), or counts per second (CPS) modes may be enabled to allow the count to be automatically, and in real time, in CPM, Bq, or CPS. While in Bq and CPS display modes the display will show the count with two decimal places.

The counter incorporates an internally housed ZnS(Ag) plastic scintillator detector with shielded 5.1 cm (2 in.) diameter stainless steel sample tray. This system supplies independent backlit LCD readouts to support alpha and beta sample counting.



## Model 3030 Alpha-Beta Sample Counter

- Fully Integrated Alpha-Beta Sample Counter
- Simultaneous Alpha and Beta Counting
- Shielded 5.1 cm (2 in.) Diameter Sample Tray
- Independent Readouts
- CPM & DPM Modes
- Background Subtraction
- Alpha/Beta Alarms
- QC Check
- 8 Hour Battery Operation
- Real Time Clock
- RS-232 Interface
- Includes PC Software



The Model 3030 Alpha-Beta Sample Counter incorporates an internally housed ZnS(Ag) plastic scintillator detector with shielded 5.1 cm (2 in.) diameter stainless steel sample tray into the Ludlum Model 3030 Scaler. This combined system supplies independent backlit LCD readouts to support discriminated alpha and beta sample counting. Key features include background subtraction, crosstalk correction, separate alpha/beta alarms, cpm/dpm operating modes, and a pre-scripted QC function with automatic reminder timer.

The instrument supports both 110 and 220 Vac operation, and includes a trickle charged gel-cell battery for portable offsite use for up to eight hours. A wide-range high voltage power supply supports virtually any detector. Status indicators located along the front panel inform the operator when a QC check is required, if the detector is non-functional, if it is operating in dpm or cpm mode, and if either an alpha or beta alarm setpoint has been exceeded.

The count time is selected via a front-panel rotary switch that enables count times ranging from 0.1 to 60 minutes, or some other prescribed value as set up via a link to a PC. Other controls include a start count button, audio volume rotary adjustment, and instrument on/off switch. An RS-232 output from the rear panel supports connection to either a printer or PC. Included in the price is PC-control software, which is a Windows application that supports setup of the system, as well as collecting and logging all count results from the 3030.



## Model 3030P Alpha-Beta Sample Counter

- Fully Integrated Alpha-Beta Sample Counter
- Simultaneous Alpha and Beta Counting
- Employs PIPS™ Detector
- Ultra Low A/B Crossover & Backgrounds
- Adjustable Alpha Window for Radon Rejection
- Data Logging with USB Connectivity
- 48-Hour Battery Operation
- Includes PC Software



The 3030P with a solid state PIPS™ detector facilitates efficient and cost-effective, simultaneous alpha and beta sample counting for air filters, smears, and swipes. This instrument meets the newer Electric Power Research Institute (EPRI) guideline for detecting a few disintegrations per minute of alpha amidst several hundred-thousand disintegrations per minute beta background. All data are automatically logged and easily retrievable via a USB connection. The light weight and battery operability afford convenient use in the field. With the optional detector shield, the Model 3030P can be used virtually anywhere.

The instrument comes with PC control software that allows the user to set all parameters, view QC check settings, change alpha and beta window and threshold values, perform MDA (Minimum Detectable Activity), and retrieve the sample data saved to the logging memory.

← [Back to partner](#)



Stralingsdetectie > Laboratoriumapparatuur

## Probes (Ludlum)

For any application Ludlum offers a wide range of probes. The probes can be used with all Ludlum models which require an external detector.



### Ludlum models with external detector a.o.:

- [Model 3000 Digital Survey Meter](#)
- [Model 3001 Multi-Detector Survey Meter](#)
- [Model 375 Area Monitor Controller](#)
- [Model 375/9 Digital Area Monitor](#)
- [Model 30 Digital Survey Meter](#)



## Partner **SDEC France**



SDEC France is een gespecialiseerde fabrikant van milieumonitoring en laboratoriumapparatuur en biedt complete oplossingen voor afval- en recyclingbeheer, milieumonitoring en laboratoriumtoepassingen. Met meer dan 30 jaar ervaring ontwerpt en produceert het bedrijf hoogwaardige instrumenten ter ondersteuning van professionals in milieuwetenschappen, landbouwkunde en radiologische veiligheid.

### Product offering

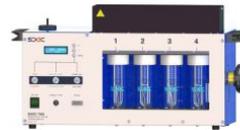
**EDP 9002 - Double Mast Electrodeposition Equipment**



**PRC 14: Maintenance Pump - For Cleaning Pipes for HAGUE 7000 CARBON 14 Bubbler**



**MARC 7000 - Tritium Bubbler: Atmospheric Monitoring System with 4 Pots (With Oven)**



**Aerosol and Iodine Sampling Heads**



**AS 5000 Portable Aerosol & Iodine Sampler DPRC Type for Air Flow Regulation - Maintenance-Free Design**



**EDP 7000 - Electrodeposition Equipment - Monostation**



**DPM 7001 Liquid Scintillation Counter - SDEC**



**H3R 7000 Airborne Tritium Condenser - SDEC**



**Single Mast  
Electrodeposition  
Equipment - EDP  
7000 - SDEC**



**Tritium sampler 4  
vials MARC 7000 -  
SDEC**





## EDP 9002 - Double Mast Electrodeposition Equipment

- **SPACE-SAVING & ECONOMICAL DESIGN:** Two measurement stations on a single base, ideal for laboratories with limited workspace. The EDP 9002 is more affordable than purchasing two EDP 7000 devices.
- **TIME EFFICIENCY:** Significant time savings when conducting multiple analyses.
- **SYNTHETIC MATERIALS:** The EDP is made solely from synthetic materials that perfectly resist the sometimes highly corrosive environments of research laboratories, thus ensuring a very long lifespan for the device.
- **HIGH PRECISION:** Ensures optimal trapping efficiency with regulated and constant direct current. The EDP is equipped with a polarity reverser for electrochemical stripping of the stainless steel pellet intended to receive the deposit, thereby ensuring perfect purity of the support.
- **COOLING SYSTEM:** Features high-flow air convection, preventing solution evaporation thanks to a solution cooling system with high-flow air convection.
- **VERSATILE SETTINGS:** Adjust the current intensity up to 5 Amperes and the electrode rotation speed with precision potentiometers and three sizes for solution containers.
- **DIGITAL TIMER:** Set the exact duration of electrodeposition with a digital display timer and an audible alarm.
- **EASY TO USE:** Quick assembly/disassembly of bottles and an internal container for accidental spills. Easy user maintenance of the device. Almost instantaneous assembly/disassembly of bottles.
- **COLLABORATION WITH COGEMA:** Designed in association with the leading French nuclear institute.





## PRC 14: Maintenance Pump - For Cleaning Pipes for HAGUE 7000 CARBON 14 Bubbler

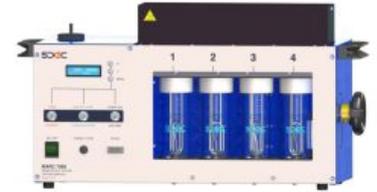
- **RELIABILITY:** PRC 14 self-priming centrifugal pump with a 150-hour motor life, operates continuously without cooling.
- **VERSATILITY:** Specifically designed for HAGUE 7000 bubblers using a diluted acid solution. This operation dissolves and evacuates the solid deposits that have accumulated inside the Ø 3 mm stainless steel pipes and in the drilled block, mainly between pots 1 and 2. It is ideal for various applications, ensuring efficient capture of atmospheric <sup>14</sup>C.
- **DURABLE CONSTRUCTION:** Equipped with an ABS impeller, stainless steel motor shaft, and nitrile seal, ensuring longevity and resilience with a constant flow rate of 10l/h.
- **ENERGY EFFICIENCY:** Maximum consumption of 60 Watts, operates ideally at 12-15 volts DC, compatible with 12V battery.
- **ECONOMICAL SOLUTION:** Offers reliability and performance at an attractive price.





## MARC 7000 - Tritium Bubbler: Atmospheric Monitoring System with 4 Pots (With Oven)

- **EFFICIENCY:** The MARC 7000 monitors atmospheric tritium, capturing vapor and gas, with oxidation in an oven.
- **PERFORMANCE:** 99% HTO trapping efficiency and 98% oven conversion efficiency for precise tritium monitoring.
- **INTEGRATED ADVANCED FUNCTIONS:** Offers adjustable airflow, real-time display of various parameters, automatic regulation, and default data storage. Designed for user-friendly operation and accurate readings.
- **PERFORMANCE:** Automatic air flow regulation, durable diaphragm pump, and 316L stainless steel circuit.
- **INTEGRATED ADVANCED FUNCTIONS:** Adjustable air flow, automatic regulation, real-time display, and anomaly storage.
- **OPTIONS FOR ENHANCED FUNCTIONALITY:** Cooling circuit, Ethernet connectivity, and alarms.
- **VERSATILE APPLICATIONS:** Suitable for the nuclear industry, research centers, waste storage, and laboratories.
- **SUPPLIER CONFIDENCE:** Officially supplied to major organizations such as IRSN, the French Navy, EDF, ANDRA, CEA, and internationally to IAEA and various nuclear power plants.
- **CERTIFICATION:** NF ISO 20045 & NF ISO 20041-1



← [Back to partner](#)



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## Aerosol and Iodine Sampling Heads

These holders are used for sampling aerosols and volatile compounds on filter paper and cartridge(s). They can be used for ambient sampling or connected to a line (e.g., type DPRC). They are made of anodised aluminium or stainless steel (on request) for various diameters of filter paper and cartridge(s):





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## AS 5000 Portable Aerosol & Iodine Sampler DPRC Type for Air Flow Regulation - Maintenance-Free Design

- **HIGH-QUALITY SAMPLING:** The AS 5000 excels in aerosol and iodine sampling, fully compliant with NF ISO 2889 standards.
- **ADJUSTABLE AIR FLOW:** Microprocessor for airflow setting from 30 to 100 liters/minute, customizable options.
- **EASY FILTER HANDLING:** TPHP head for easy installation and retrieval of filters, without interrupting the air circuit.
- **EASY DATA TRANSFER:** Transmits data via Ethernet, an available option.
- **PRECISE MONITORING:** Tracks sampled air volume and alerts for clogging and leaks, with audible and written reports.
- **CERTIFICATION:** NF ISO 2889





## EDP 7000 - Electrodeposition Equipment - Monostation

- **SYNTHETIC MATERIALS:** Made from synthetic materials resistant to the corrosive environments of laboratories, ensuring longevity of the EDP.
- **HIGH PRECISION:** Ensures optimal trapping efficiency with a regulated and constant direct current. The EDP is equipped with a polarity reverser for electrochemical stripping of the stainless steel pellet intended to receive the deposit, thereby ensuring perfect purity of the support.
- **COOLING SYSTEM:** High-flow air convection to prevent solution evaporation, thanks to a cooling ventilation system.
- **VERSATILE SETTINGS:** Precise settings for current intensity up to 5 Amperes and electrode rotation speed.
- **DIGITAL TIMER:** Timer with digital display and audible alarm for exact duration of electrodeposition.
- **INTUITIVE USE:** Quick installation of bottles, internal container for spills, easy maintenance.
- **COLLABORATION WITH COGEMA:** Designed in partnership with COGEMA, a leading French nuclear institute.



← [Back to partner](#)



Stralingsdetectie > Laboratoriumapparatuur

## DPM 7001 Liquid Scintillation Counter - SDEC

De DPM 7001 Liquid Scintillation Counter (SDEC) is een mobiele vloeistofscintillatieteller uitgerust met twee fotomultiplifiers, waardoor deze een hoge telefficiëntie en weinig achtergrondgeluid heeft. Het is speciaal ontworpen voor het tellen van tritium en koolstof-14. Door zijn kleine formaat en zijn lichte gewicht (16 kg) kan hij gemakkelijk worden vervoerd naar meetlocaties voor snelle metingen.



### Kenmerken van de DPM 7001

#### vloeistofscintillatieteller:

- hoge telefficiëntie (H3 > 37%, C14 > 94%)
- weinig achtergrondgeluid (< 40 CPM)
- lichtgewicht: 16kg
- bediening en aflezing op LCD-display of op PC (optionele software)
- gegevensexport in Excel-formaat
- twee telkanalen voor twee gelijktijdige tellingen

Lees meer over de DPM 7001 vloeistofscintillatieteller op de [SDEC-website](#)



## H3R 7000 Airborne Tritium Condenser - SDEC

De H3R 7000 Airborne Tritium Condensator (SDEC) is een innovatief instrument op het gebied van Tritium bij luchtmonstering. Het verzamelt monsters van tritium in dampvorm en produceert resultaten in minder dan 40 minuten. Het verkregen monster kan tot een detectiegrens van 0,01 Bq/m<sup>3</sup> worden gemeten door uitgestelde meting met behulp van vloeistofscintillatie.



### Kenmerken van de H3R 7000 tritiumcondensator in de lucht:

- snelle startmodus
- meting en berekening in realtime van de absolute vochtigheid in de omgevingslucht in g/m<sup>3</sup>
- automatische berekening van de opvangtijd afhankelijk van de benodigde waterhoeveelheid
- automatisch drogen onder hoge temperatuur van het vangcircuit om kruisbesmetting te voorkomen
- selectie van de droogtijd
- USB-uitgang: gegevensherstel op USB-sleutel
- thermische printer geïntegreerd: printen van gegevens op sticker om op monsterflesje te plakken

Lees meer over de H3R 7000 Airborne Tritium Condensator op de SDEC-website



Stralingsdetectie > Laboratoriumapparatuur

## Single Mast Electrodeposition Equipment - EDP 7000 - SDEC

De maatstaf voor radio-isotopen wordt in de nucleaire geneeskunde gebruikt om het besmettingsniveau van een patiënt die radio-isotopen heeft gemanipuleerd, te controleren en te volgen. Bij het meten van een radio-isotoop is het gewoonlijk het eerste wat u moet doen, deze op te vangen en op een drager te laten neerslaan.



Het Single Mast Electrodeposition Equipment - EDP 7000-systeem is het meest efficiënte principe voor het vangen van een radio-element in een vloeibare oplossing. Dit principe maakt het mogelijk om de radio-isotopen in een oplossing op een metalen plaat af te zetten. Om de hoeveelheid opgevangen radio-elementen te meten, wordt de metalen plaat daarna in een geschikte machine (spectrometer of andere) geplaatst.

### apparatuur voor elektrodepositie met één mast - EDP 7000-kenmerken:

- Synthetische materialen.
- temperatuurbeheersing van de oplossing.
- drie maten oplossingscontainers.
- snel schroeven/losschroeven.
- eenvoudig onderhoud door de operator.
- schakelaar voor omgekeerde polariteit.
- onafhankelijke timer.

Lees meer over de Single Mast Electrodeposition Equipment op de SDEC-website



## Tritium sampler 4 vials MARC 7000 - SDEC

De apparatuur Tritium sampler 4 vials (MARC 7000) is ontworpen om tritium te bemonsteren dat zich in een luchtvolume bevindt (gas H<sub>3</sub>, getritieerd water HTO of organisch gecombineerd). Door middel van het borrelprincipe wordt getritieerde waterdamp in de eerste twee zuigflessen opgevangen. Om het tritium dat wordt gecombineerd tot organische materialen op te vangen, wordt in de oven een oxidatiereactie gecreëerd. Er wordt gebruik gemaakt van een katalysator om het verbrandingsniveau te verlagen. Dit zorgt ervoor dat tritium chemisch reageert en getritieerde waterdamp vormt, die wordt opgevangen in zuigflessen nr. 3 en 4. Na een bepaalde tijd wordt het getritieerde water in de flessen gemeten in een laboratorium. De gemeten hoeveelheid tritium is gerelateerd aan de hoeveelheid lucht die door de apparatuur is gestroomd.



### Tritium-sampler 4 flesjes kenmerken:

- uitstekende vangefficiëntie (bijna 99%)
- koelsysteem om de bemonsteringslengte te vergroten (optie)
- goede prijs
- constante evolutie van het product
- makkelijk te gebruiken
- aansluitbaar op alle bemonsteringslijnen

Lees meer over de Tritium sampler 4 vials (MARC 7000) op de website van SDEC



## Partner **Spectrum Techniques**

**Spectrum Techniques** Spectrum Techniques is een toonaangevende leverancier van oplossingen voor stralingsdetectie en -meting, gespecialiseerd in laboratoriumapparatuur en radioactieve bronnen. Hun aanbod omvat een reeks instrumenten en detectoren die zijn ontworpen ter ondersteuning van educatieve, onderzoeks- en industriële toepassingen.

### Product offering

|  |   |  |
|--|---|--|
| <p><b>Advanced Spectroscopy System</b></p>  | <p><b>SCINTILLATION WELL COUNTING SYSTEM</b></p>  | <p><b>Intermediate Nuclear Laboratory System</b></p>  |
|--|---|--|

← [Back to partner](#)



Stralingsdetectie > Laboratoriumapparatuur

## Advanced Spectroscopy System

The Advanced Spectroscopy System, your comprehensive solution for advanced nuclear experimentation and analysis.

**Sophisticated Capabilities:** Our cutting-edge systems are engineered to meet the demands of diverse applications, from academic research and industrial quality control to environmental monitoring and nuclear medicine. They empower users with the tools needed to delve deep into the intricacies of radiation spectroscopy.

**Tailored Solutions:** Offering a range of models and configurations, these systems are highly customizable to align perfectly with your specific requirements. Whether you need energy resolution, peak analysis, or nuclide identification, our systems are designed to adapt.

**Superior Detector Technology:** At the heart of our spectroscopy systems lies advanced detector technology, delivering unparalleled sensitivity and accuracy. From scintillation detectors to high-purity germanium detectors, our instruments are optimized for peak performance.

**User-Friendly Interface:** Navigating the complexities of radiation analysis has never been easier. Our intuitive software interfaces simplify data acquisition and analysis, allowing users of all skill levels to achieve precise results.

**Reliability and Support:** Backed by Spectrum Techniques' decades of expertise, these systems are built for longevity and backed by top-notch technical support. We're committed to ensuring your success in radiation spectroscopy.

Elevate your research, enhance your quality control, and make breakthroughs in nuclear science with Spectrum Techniques' Advanced Spectroscopy Systems. Explore the limitless possibilities today.

The System is built around the UCS-30 and a 1.5" x 1.5" NaI(Tl) detector; it is designed for conducting a wide selection of spectroscopy experiments.



← Back to partner



Stralingsdetectie > Laboratoriumapparatuur

## SCINTILLATION WELL COUNTING SYSTEM

The Wipe System - a state-of-the-art solution for the precise and efficient collection of radioactive contamination.

**Effortless Contamination Detection:** Our Wipe System is designed to simplify and enhance the process of identifying and quantifying radioactive contamination. With meticulous attention to detail, it enables you to maintain the highest standards of safety and environmental protection.

**Comprehensive Solution:** This system comprises user-friendly software and specialized wiping materials, ensuring a comprehensive approach to contamination monitoring. It empowers users across various industries, including nuclear facilities, healthcare, and environmental laboratories.

**Accurate and Reliable:** Spectrum Techniques' Wipe System is built on cutting-edge technology, offering unparalleled accuracy and reliability. It allows you to confidently detect and measure radioactive contaminants, safeguarding your personnel and the environment.

**Customizable for Your Needs:** We understand that different applications have unique requirements. Our Wipe System is customizable to meet your specific needs, offering flexibility in terms of sample size, detection thresholds, and reporting options.

**Exceptional Support:** As with all Spectrum Techniques products, our Wipe System is backed by a team of experts dedicated to ensuring your success. Our technical support and training resources are available to assist you every step of the way.

Upgrade your contamination monitoring process with Spectrum Techniques' Wipe System. Stay compliant, protect your environment, and mitigate risks with precision and confidence.



← [Back to partner](#)



Stralingsdetectie > Laboratoriumapparatuur

## Intermediate Nuclear Laboratory System

The Intermediate Plus Nuclear Laboratory System, your comprehensive solution for advanced nuclear experimentation and analysis.

**Unparalleled Versatility:** This cutting-edge system is meticulously crafted to cater to the evolving needs of educational institutions, research facilities, and nuclear science enthusiasts. With its versatile design, it's perfectly suited for a wide range of applications, including teaching, advanced research, and radiation safety studies.

**Precise Data Acquisition:** Equipped with state-of-the-art technology, the Intermediate Plus Nuclear Laboratory System ensures precise data acquisition. It empowers users to conduct experiments with confidence, facilitating a deeper understanding of nuclear phenomena.

**Seamless Integration:** Our system seamlessly integrates with an array of detectors, amplifiers, and software, providing a comprehensive toolkit to explore and analyze radiation sources effectively. It's engineered for ease of use, making it accessible to both novice and experienced users.

**Enhanced Features:** The Intermediate Plus Nuclear Laboratory System boasts an array of enhanced features, including user-friendly software for data analysis, adaptable detector options, and flexible connectivity options, allowing you to tailor your experiments to your specific requirements.

**Reliability and Support:** Backed by Spectrum Techniques' commitment to quality and customer satisfaction, this system is built to last and comes with exceptional technical support to ensure your research and educational objectives are met with ease.

Unlock the potential of nuclear science with confidence, precision, and versatility using the Spectrum Techniques Intermediate Plus Nuclear Laboratory System. Elevate your experiments and research to new heights with this comprehensive solution.





## Partner **GEORADIS s.r.o.**



Georadis s.r.o. is een gespecialiseerde fabrikant van geavanceerde instrumenten voor stralingsdetectie en -monitoring en biedt een uitgebreid scala aan oplossingen voor veld- en laboratoriumtoepassingen. Hun productportfolio omvat handeld monitoren, draagbare isotopeidentifiers, apparatuur voor omgevingsmonitoring en laboratoriumapparatuur, allemaal ontworpen om te voldoen aan de strenge eisen van professionals in sectoren zoals milieumonitoring, industriële veiligheid en openbare veiligheid.

### Product offering

**RT-50 Laboratory  
Gamma-Ray  
Spectrometer -  
Georadis**



← Back to partner



Stralingsdetectie > Laboratoriumapparatuur

## RT-50 Laboratory Gamma-Ray Spectrometer - Georadis

The RT-50 (Georadis) is a state of the art gamma spectrum analyzer to monitor and detect the presence of radiation in metals, metals by-products, geological samples, construction materials, environmental commodities, food and many other materials. Floor standing and easy to operate, the RT-50 spectrum analyzer is an indispensable part of any analytical laboratory, it rapidly detects and accurately measures extremely low levels of radioactive contamination.



### RT-50 Laboratory Gamma-Ray Spectrometer features:

- full sample analysis in less than 5 min
- sensitivity; 0.02 Bq/g
- energy range: 20 keV - 3,0 MeV
- 1024 channel pulse amplitude analyzer
- short calibration times
- NaI(Tl) volume 0.35 l, 76 x 76 mm (3"x3") detector

Read more about the RT-50 Laboratory Gamma-Ray Spectrometer on the [Georadis website](#)



## Partner **Kromek**



Kromek Group plc is een wereldleider in geavanceerde stralingsdetectietechnologieën en is gespecialiseerd in compacte oplossingen met een hoge resolutie voor beveiligings-, defensie-, nucleaire en onderzoekstoepassingen. Kromek maakt gebruik van gepatenteerde Cadmium-Zinktelluride (CZT) halfgeleidertechnologie en levert een veelzijdig portfolio met handheld monitoren, draagbare isotopeidentifiers, CZT-gebaseerde gammacamera's en spectrometers van laboratoriumkwaliteit.

### Product offering



← [Back to partner](#)



## Stralingsdetectie > CZT & Gamma Camera's **Quant GR1**

The Quant GR1 is a complete mobile or benchtop solution for quantifying doses of Gamma radiation released by radionuclides. Its high resolution of <math><2\%</math> and count spectrum range of 4096 channels enables any isotope to be identified and its associated dose quantified, even from complex mixtures.

The ability to quantify radiation doses in real time eliminates the need for further analysis in the lab, as data can both be collected and processed on site, saving time and costs.





## Partner **Ultra Electronics**



Lab Impex Systems (LIS) is sinds 17 juli 2014 onderdeel van Ultra Electronics. Zij staat bekend als gespecialiseerde fabrikant van stralingsdetectie-oplossingen en diensten voor gebruik in de wereldwijde nucleaire industrie.

LIS is al sinds 1976 marktleider op het gebied van ontwerpen, ontwikkelen en vervaardigen van meetinstrumentatie speciaal gericht op stack monitoring.

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### Product offering

**CMS Iodine Monitor -  
Lab Impex Systems**





## CMS Iodine Monitor - Lab Impex Systems

De CMS Jodium Monitor (Lab Impex Systems) is een geavanceerd systeem voor het monitoren van de concentratie van radioactief jodium in de lucht op de werkplek en in andere aandachtsgebieden (stapels, cellen en handschoenenkasten).

De monitor is beschikbaar in isotopische specifieke configuraties, waaronder I-124, I-125, I-129 en I-131, en biedt realtime metingen van zowel moleculaire als organische vormen van jodium.

Bovendien is het systeem verkrijgbaar in een op een skid, behuizing of kar gemonteerde configuratie.

Het sensorelement van de jodiummonitor is een gepatenteerde detector, de CGADC (Continuous Gas Analysis and Detection Chamber). De CGADC combineert een gevoelige scintillatiedetector met een roestvrijstalen meetkamer waarin zich een filterpatroon met radioactief jodium bevindt. De CGADC is verpakt als een geïntegreerd apparaat, met afscherming, pomp, flowsensor en CMS-processor, en is verkrijgbaar in een vaste of transporteerbare configuratie.

### CMS Jodium Monitor-functies:

- Het filtermechanisme vangt alle vormen van radioactief jodium op
- bereikt lage MDL's door uniek detectorontwerp met Brehmstrahlung-schild
- automatische achtergrondcompensatie
- temperatuurspectrumstabilisatie vermindert onnauwkeurige metingen als gevolg van spectrumdrift
- Het CMS-analysealgoritme biedt een lage, stabiele meting op de achtergrond, maar zorgt voor een snelle reactie op stijgende concentratieniveaus

Lees meer over de CMS Jodiummonitor op de website van Lab Impex Systems.

