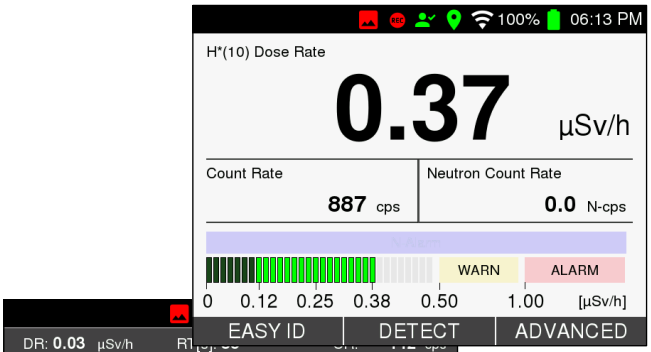
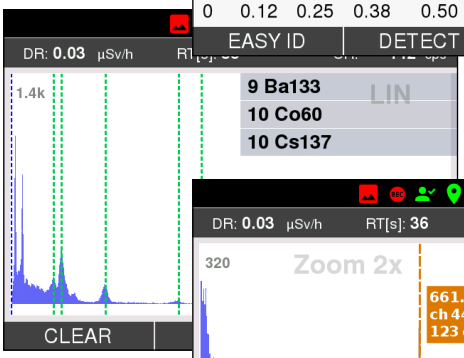
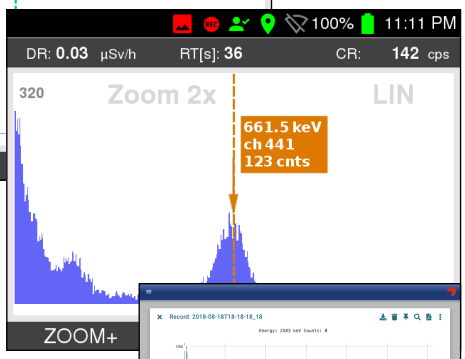
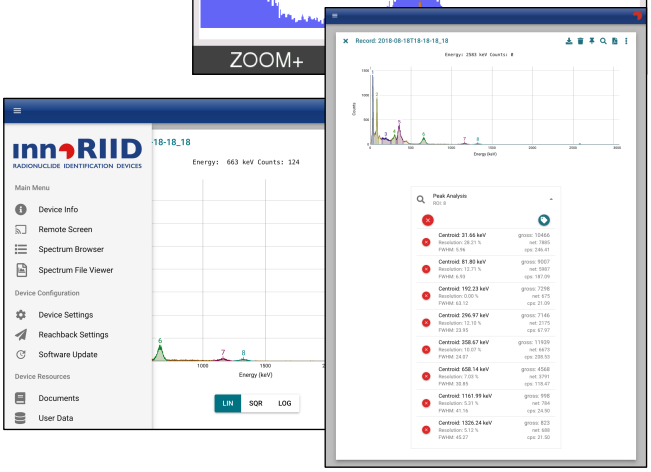
RADEAGLE

High-Sensitivity RIID









Next-Generation

Radio Isotope Identification Device

The last decade has seen several novel technologies for spectrum analysis driven mostly by the revolving requirements of both nuclear security and safety. With the RADEAGLE exploiting the latest break-through research results in the field of nuclear detection and nuclide analysis innoRIID provides you a scientific high-tech instrument far beyond the state-of-the-art.

Facing the Threats of Tomorrow

- Police and Fire Brigades
- Nuclear Safeguards
- Steel and Scrap Industry
- Nuclear Medicine
- Customs and Border Patrol
- Defence Agencies and Military
- Scientific Institutions

Spectroscopic Precision — Made in Germany

innoRIID has a solution for these customers: the RADEAGLE, a handheld spectrometer and mobile, autonomous nuclear laboratory developed by engineers comprising over thirty years of professional experience in the radiation detection business.

innoRIID
RADIONUCLIDE IDENTIFICATION DEVICES

Technical Specifications

Physical Properties

Mass	2600 g aluminum housing with powder coating
Dimensions	248 mm x 115 mm x 152 mm
Display	640 x 480 pixel, 89 mm (3.5") transflective color TFT
Batteries	rechargeable NiMH batteries, can be charged inside the instrument
Operation Time	>8 h internal battery pack (>16h extension battery pack)
Protection Class	IP65

Spectroscopic Properties

Spectroscopic Detectors	3" × 1" with 3" PMT NaI 2" × 1" with 3" PMT $LaBr_3$ 3" × 0.8" with 3" PMT $CeBr_3$
FWHM Resolution	≤7.2 % @ 661.65 keV, 22 °C for NaI ≤3.2 % @ 661.65 keV, 22 °C for $LaBr_3$ ≤4.2 % @ 661.65 keV, 22 °C for $CeBr_3$
MCA	2048 = 2k channels
Energy Range	15 keV - 3 MeV
Sensitivity	> 2500 cps/(µSv/h) measured with unshielded ^{137}Cs and 3" x 1" NaI detector
Calibration Source	Automatic calibration on natural background, no internal source required
Dose Rate Range	0.01 - 200 µSv/h (Scintillator, NaI) 0.001 - 20 mrem/h (Scintillator, NaI) up to 1 Sv/h = 100 rem/h (GM tube)
Categorization	Medical (MED), Industrial (IND), Special Nuclear Material (SNM), Naturally Occuring Radiation Material (NORM)
Default Isotopes	^{110m}Ag, ^{241}Am, ^{133}Ba, ^{207}Bi, ^{109}Cd, ^{252}Cf, ^{57}Co, ^{60}Co, ^{51}Cr, ^{134}Cs, ^{137}Cs, ^{152}Eu, ^{18}F, ^{67}Ga, ^{68}Ga, ^{123}I, ^{131}I, ^{111}In, ^{192}Ir, ^{40}K, ^{99}Mo, ^{54}Mn, ^{22}Na, ^{237}Np, ^{238}Pu, RGPu, WGPu, ^{226}Ra, ^{75}Se, ^{90}Sr, ^{99m}Tc, ^{232}Th, ^{201}Tl, ^{232}U, ^{233}U, ^{235}U, ^{238}U
Optional Isotopes	^{109m}Ag, ^{198}Au, ^{135m}Ba, ^{140}Ba, ^{213}Bi, ^{116}Cd, ^{58}Co, ^{139}Ce, ^{141}Ce, ^{144}Ce, ^{131}Cs, ^{64}Cu, ^{67}Cu, ^{165}Dy, ^{59}Fe, ^{68}Ge, ^{166m}Ho, ^{124}I, ^{132}I, ^{133}I, ^{194}Ir, ^{42}K, ^{81m}Kr, ^{138}La, ^{140}La, ^{173}Lu, ^{174}Lu, ^{176}Lu, ^{177}Lu, ^{177m}Lu, ^{56}Mn, ^{24}Na, ^{95}Nb, ^{96}Nb, ^{147}Nd, ^{210}Pb, ^{212}Pb, ^{103}Pd, ^{144}Pr, ^{82}Rb, ^{186}Re, ^{188}Re, ^{106}Rh, ^{103}Ru, ^{106}Ru, ^{132}Te, ^{75}Se, ^{153}Sm, ^{113}Sn, ^{82}Sr, ^{89}Sr, ^{228}Th, ^{44}Ti, ^{202}Tl, ^{204}Tl, ^{237}U, ^{187}W, ^{131m}Xe, ^{133}Xe, ^{133m}Xe, ^{135}Xe, ^{169}Yb, ^{177}Yb, ^{88}Y, ^{90}Y, ^{65}Zn, ^{95}Zr
Neutron Detector	^{3}He detector with internal moderator (optional)

Computational Subsystem

Memory Capacity	>1000000 spectra
CPU Speed	1 GHz
File Format	N42.42, SPE
Positioning	GPS (optional)
Connectivity	USB, WLAN

PC Software

Operating Systems	Microsoft® Windows, MacOS®, Linux®
User Interface	Web interface

Software and Intuitive User Interface

The software of the RADEAGLE is a gem of programming craftsmanship and its user interface is remarkably easy and intuitive to use. Each numerical value is visually assisted by a dynamic intensity bar to indicate the strength of radioactive material. The instrument features e.g. a dose rate mode, a detection mode for efficient localisation of sources and an expert mode for spectroscopic analysis allowing to visually inspecting the measurement.

Identification Applies Artificial Intelligence

Smart, so-called ensemble neurones form a multi-agent system that is deployed for nuclide identification. The system uses a learning algorithm that adapts reference data (templates) to the individuality of the instruments radiation sensors. This “neuro-spectroscopic brain” is capable to access the natural background radiation continuously and takes care of identifying the radioactive sources. The nuclide library of the RADEAGLE contains the all relevant nuclides and exceeds the specifications of ANSI N42.34. It categorises Special Nuclear Material (SNM), Industrial (IND), Medical (MED) and Naturally Occurring Material (NORM).

Special Nuclear Material

The RADEAGLE identifies all relevant uranium isotopes including ^{238}U, ^{235}U, ^{232}U, ^{233}U. The RADEAGLE identifies also all relevant plutonium isotopes and designates their grades including reactor-grade and weapon-grade Plutonium. The rare ^{238}Pu is also included in the library, as well as ^{237}Np.

The RADEAGLE identifies the strontium isotope ^{90}Sr, which is a pure β emitter.

innoRIID

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innoRIID GmbH
Merowingerplatz 1a
40225 Düsseldorf
Germany

www.innoriid.com
info@innoriid.com
+49 2182 823626