CAEN SyS

CAEN Spectroscopy Division

RADIONUCLIDE IDENTIFYING DEVICE (RID)

DiscoveRAD

APPLICATIONS AND SCENARIOS

The DiscoveRAD is the most efficient Radionuclide Identifying Device (RID) currently available on the market.

Law enforcement, customs, and other agencies are using RIDs as part of a national strategy to stop the illicit trafficking of radioactive material.

When radiation sources are detected by screening devices such as radiation portal monitors, RIDs are used to analyze the nature of the radioactive source and determine if it presents a high-level threat.

Radiological emergency personnel, firefighters, and other responders also use RIDs for situational awareness during radiological emergencies.

DESCRIPTION

The **DiscoveRAD** is a high efficiency radionuclide identifier (RID) instrument designed for fast detection and accurate identification of radioactive sources.
It is an ultra-compact, rugged, sensitive Radionuclide Identifying Device (RID).
Its weight and dimensions allow it to be worn on a belt while easily performing gamma and neutron measurements in real time.
The **DiscoveRAD** provides in a user friendly interface:

- **Dose rate mode**: with neutrons and dose rate (in Sv/h or R/h) real-time values and alarm thresholds displayed simultaneously. Radioprotection alarms are provided by audible and vibration alarms
- **Survey mode**: with gamma, neutron and dose rate real-time values and gamma and neutron alarm thresholds displayed. An audio alarm with a tone proportional to the count level warns the user of the severity of the threat
- **Easy finder mode**: provides directionality to easily localize the source
- **Identification** mode: with live spectrum visualization and automatic report generation including: identified isotopes, their category (IND, NORM, MED, SNM) and confidence level of the identification.

The **DiscoveRAD** is the first RID equipped with a 2”x 1” size BGO detector combined with high precision, high-speed digital electronics in an ergonomic lightweight water-tight (IP68) aluminum housing that provides superior usability by offering a wider energy range, higher throughput, and better stability in a wearable handheld.
The **DiscoveRAD** isotopes identification is extremely accurate because it uses a template matching algorithm combined with exceptional spectrum stabilization instead of the traditional peak search.

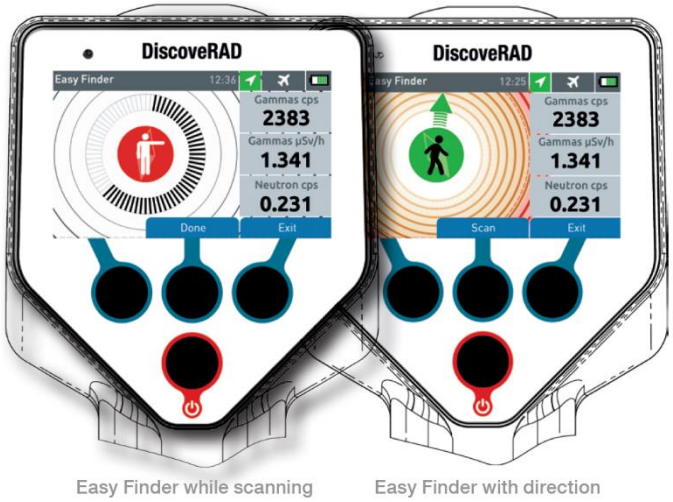
The **DiscoveRAD** is made for the mission thanks to its superior and patented stabilization algorithm (pat. US 9,864,076) which does not require any built-in

source or LED. The novel patented stabilization compensates gain shifts and temperature effects immediately and automatically. The main advantages of this new method are:

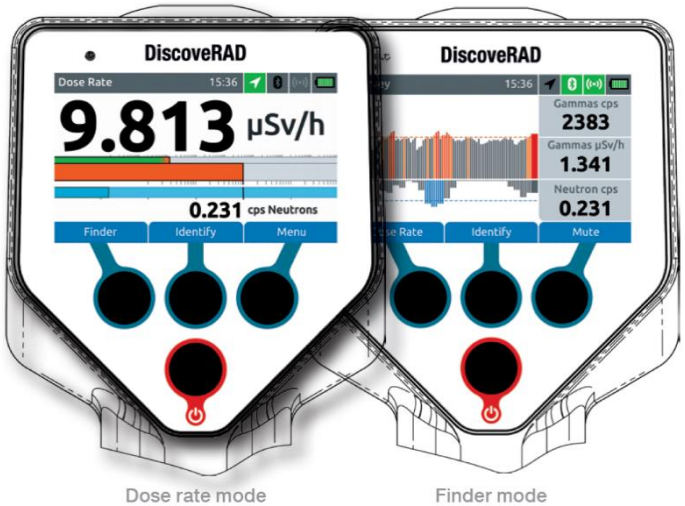
- No internal radioactive stabilization source is “blinding” the instrument.
- No buggy LED light emitter can compromise the stabilization.
- Superior stability in every situation.

The consistent performance of the **DiscoveRAD** under all conditions and environments, while maintaining the highest accuracy in the results, reduces false positives and expedites decision-making in the field.

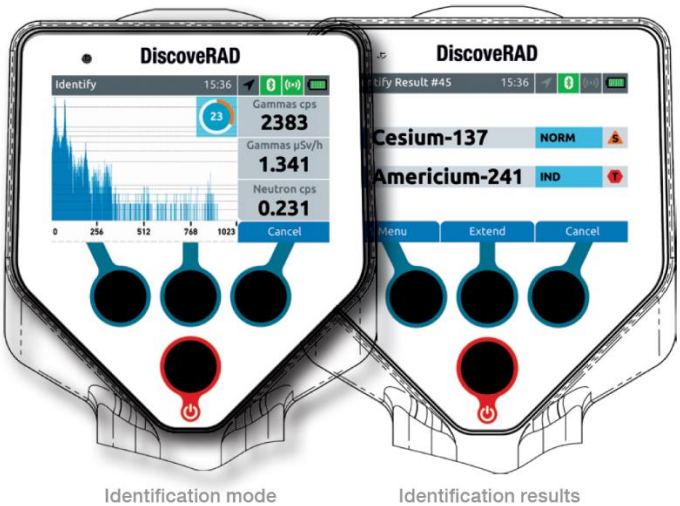
Highly sophisticated analog and digital electronics make it possible for the first time to measure a wide gamma dose rate range and neutrons with a single BGO detector. Small radiation levels can be detected earlier, quicker and with higher accuracy than by other comparable handhelds.



Easy Finder while scanning — Easy Finder with direction



Dose rate mode — Finder mode



Identification mode — Identification results

MAIN FEATURES

The DiscoveRAD is a RID with a 2”x1” BGO detector for simultaneous detection of gamma and neutrons. This radiation spectroscopy system is designed to search for radiological materials.

- Spectra view and analysis with data storage (25 GB) for reach back
- Small, lightweight (< 1,25 Kg, <2,7 lbs)
- Underwater operation to 10 meters (IP68)
- User Interface with day and night view
- High accuracy dose measurement
- Finder mode with directionality
- Spectrometry at up to 1 million cps between 10 keV to 10 MeV
- Replaceable batteries
- Three buttons operation
- Multiple modes of configuration
- Operation from remote PC with full view of the screens
- N42.42 data format
- Superior efficiency with rugged non-hygroscopic BGO detector

USE CASES

- The DiscoveRAD detects gamma, beta, neutron, and cosmic radiation emitted from natural and man-made sources.
- Identification of special nuclear material, industrial, medical, and natural radioactive sources.
- Measurement of x-ray and gamma exposure.

It is specifically suited for scenarios involving Material Out of Regulatory Control (MORC) like the smuggled Special Nuclear Material (SNM) or scenarios such as:

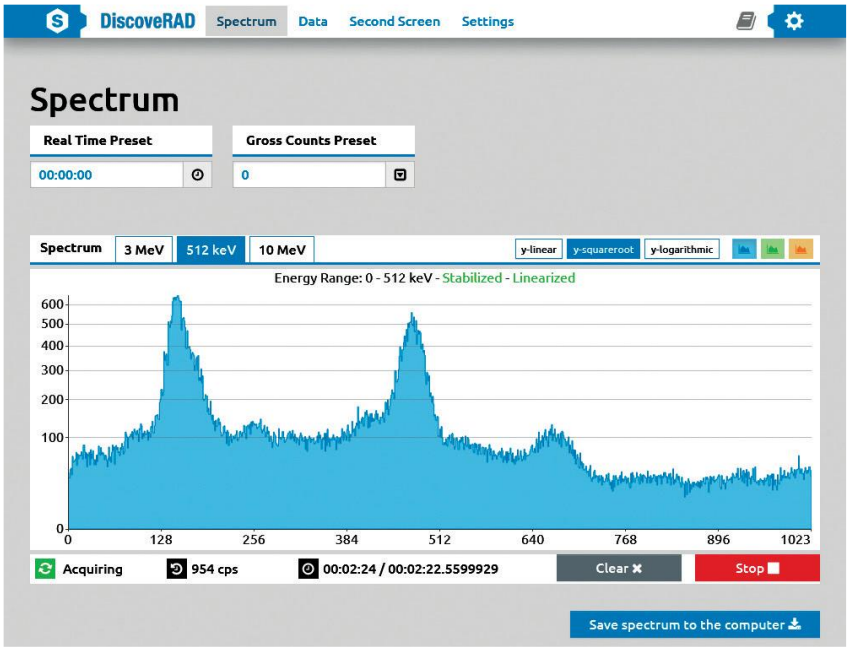
- Interception and prevention of terrorist threats through RDD's (Radioactive Dispersal Device) or dirty bombs
- Orphan source searching and identification
- Emergency and first response applications for a prompt control of the contaminated area
- Border and custom control
- Nuclear safeguards, and nuclear security operations
- Location survey and control before, during and after public events

NIGHT MODE:
Allows working in total darkness without blinding the user

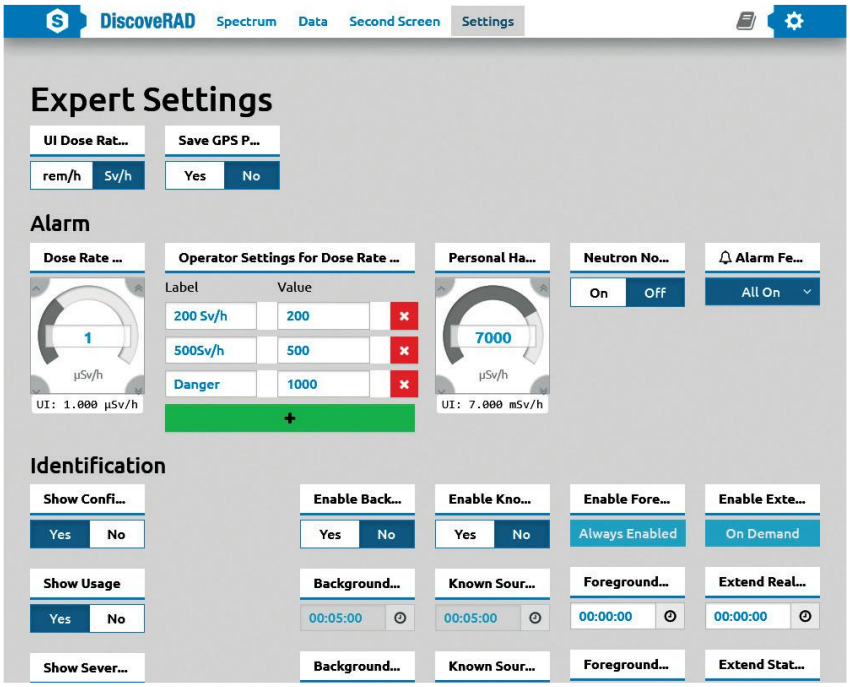
WIRELESS REMOTE-CONTROL MODE
DiscoveRAD can generate a Bluetooth or Wi-Fi access point.
The user can securely connect with his smartphone/PC to the access point and remotely control the DiscoveRAD.

Strong radiation sources are measured and identified by the DiscoveRAD at really high input rates. Spectrometry is performed at up to 1 million cps between 10 keV to 10 MeV.

It's not over when you are back
All measurements are saved on the instrument (25 GB user storage capacity) and can easily be transferred without special software.
Its multiple interfaces and the built-in web interface allow easy and flexible reach-back operation.
The interface also provides for secure remote maintenance and remote operation of the instrument.



The acquisition of a spectrum with the web interface



The password protected area for the expert settings

TECHNICAL SPECIFICATIONS

Scintillation Detector

- One crystal for detection of both gamma and neutron
- 51 x 25 mm (2"x1") BGO ($Bi_4Ge_3O_{12}$) detector

Radiation Measurement Performances

- 70 Nuclides (exceeding IEC 62755, ANSI 42.34)
- Operative in less than one minute
- Identification of 1 µCi of Cs-137 in 13s
- Real-time linearization of gamma energy

Gamma

- Energy range
  - 10 keV ÷ 100 MeV (Gamma and X-rays)
  - 10 MeV_{ee}– 1000 MeV_{ee} (cosmic radiation, muons, charged particles)
- Maximum input count rate in id mode: 1 million cps (Cs-137)
- Gamma sensitivity: 1850 cps/µSv/h (Cs-137)
- FWHM @662 keV (Cs-137): 9.0 ±1.5 %

Neutron

- According to ANSI N42.34
- Sensitivity: 5 cps/nv

Dose-Rate range (Cs-137)

- Dose rate range: 10 nSv/h - 10 mSv/h (1 µrem/h - 1 rem/h) ±30 %
- Dose rate range ID mode: 10 nSv/h - 200 µSv/h (1 µrem/h - 20 mrem/h)
- Dose rate overload range: 0.2 mSv/h - 500 mSv/h (0.02 rem/h - 50 rem/h)

Sensors

- GPS: switchable 72 channel M8 engine (Navstar, Galileo, Glonass, Beidou)

Communication interfaces

- USB-C power and data port
- Wi-Fi access point 2,4 GHz 802.11 g, encryption WPA-PSK AES
- Bluetooth LE for connection to the Mobile App

Data acquisition

- MCA depth: 1024 channels

Physical

- Dimensions: 235 x 88 x 92 mm / (9.3" x 3.5" x 3.6")
- Weight: 1250 g / (2.7 lbs)
- Housing material: aluminum

Operating condition

- Protection rating: IP68 according to IEC 60529 10 m (0.4") 30 min submergible
- Operating/storage temperature: -20 °C to 50 °C (-4 °F to 122 °F)
- Operating humidity: up to 93 % at 40 °C (104 °F) non-condensing
- Charging temperature: 0 °C to 40 °C (+32 °F to 104 °F)

Software

- User-interface update frequency is 0.5 s
- Operative modes**:** Dose rate, Survey, Easy finder (directionality), Identification, expert modes
- Web server: Web Interface for setup, data download and remote control
- Data streaming: Supporting Sigma streaming API via BT tethering
- Data reporting: Supporting Sigma reporting API via BT tethering
- Session data: Continuously tracking GPS position, dose rate, alarms and identification results
- Night mode
- Screen rotation
- 30 GB internal data storage

Power supply

- Secure rechargeable Li-Ion battery pack (1 + 1 spare included)
- Run time at 20 °C (68 °F): > 6 h (non-alarm state)
- Run time at -20 °C (12 °F): > 1 h (non-alarm state)
- AC/DC included 220/100 V/AC to 5V/DC

Mobile app:

- Remote Operation: Use any mobile device to remote operate the instrument
- Reach back: functionality (Mail with attached ANSI 42.42 data)

Standard compliance:

- RID: IEC 62327, ANSI N42.34
- Environmental tests: IEC 62706
- Data format: ANSI 42.42, IEC 62755

Accessories:

- Rugged carrying case, Micro-B socket USB cable

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