



# D3S

The power to make the right decisions about nuclear threats in seconds

## D3S PRD



Cost-effective radiation detection and preliminary identification for first-line users

## D3S ID



Complete radiation detection system for CBRN professionals that enables safe monitoring in high dose environments

# Power to Perform

D3S high-performance detectors are designed to fit your operational needs. They are game-changing devices that are revolutionising in-field isotope detection and identification.

Though radiation emergencies are rare, you need to be on your guard and ready to act at any time. The D3S gives you the power to make informed decisions about nuclear threats in seconds.



The most complete radiation detection solution in a single device with two modes of operation: PRD and RIID - at the touch of a button

**D3S PRD - a high-speed PRD with isotope ID in seconds**

**Cost-effective radiation detection and preliminary identification for first-line users**

**D3S ID - complete radiation detection system for CBRN professionals that enables safe monitoring in high dose environments**

**Far exceeds the RIID standard, identifies 22 extra isotopes, 4 times faster**

## Ready to act

The D3S is one of the fastest and most accurate isotope ID devices on the market that will help you carry out wide area searches when used in conjunction with an Android smartphone.

The D3S is small but powerful, wearable and discreet. At just five inches tall it's smaller than your average smartphone. The ID App will easily detect even very low levels of radiation rapidly, even if they pose no significant risk.

## What happens when it detects a threat?

There is a three-second rolling average to detect and identify sources of radiation. As well as a rapid, visible, audible and tactile alarm settings. The D3S will classify and categorise industrial, medical, NORM and SNM isotopes, empowering you to take the appropriate action.

It is designed for in-field deployment, helping you monitor your immediate surroundings, always-on, always scanning in the background. Its 12-hour battery life means it keeps working your whole shift long.

It is available in two powerful versions: the PRD and ID. The PRD delivers cost-effective radiation detection and preliminary identification for first-line users.

## What do I get?

The D3S is a powerful combination of two of Kromek's leading technologies; the non-<sup>3</sup>He compact thermal neutron detector and its world leading gamma detector.

The detection algorithm provides substantial enhancements in the detection and identification of low activity shielded threats, masked threats and nuisance isotopes and has been extensively tested and characterised in multiple CWMD and DARPA programs.

You can use it discreetly. Once it's on, clip it on your belt or tuck it in your pocket. No one will realise you're using the D3S because it works via an Android smartphone app which transforms it into a highly capable detection device in seconds, either via Bluetooth or USB.

## You can easily upgrade the D3S PRD to a D3S ID

The D3S PRD is easily upgraded in-field to a D3S ID giving you access to the full versatility and the complete range of features of this powerful handheld device.

A simple upgrade to your licence key and you have access to the most complete radiation detection solution in a single device with two modes of operation: PRD and RIID.



### Content includes:

- Manuals
- D3S
- Smartphone
- Chargers and wearable carry pouch

### Smartphone:

*Ruggedised (Sonim XP8) and non-ruggedised (Samsung Galaxy S10) phone options are available*

### Helping you to:



Assess the situation



Manage the risk



Make informed decisions within seconds

# D3S PRD

The D3S PRD is a spectroscopic radiation detector designed for sensitive detection of radioactive and nuclear materials. It is the only PRD that detects the presence of radiation and also displays the isotope ID in seconds.

Small, lightweight and user-friendly, the D3S PRD is a continuous search device that can be worn by first responders as well as customs and border protection personnel to quickly and accurately detect, locate and intercept radiological threats. It can also be carried by event security personnel and law enforcement as part of their regular equipment.

There is a simple user interface with both visual and audio status updates and notifications. As well as providing continuous dose reading, the D3S PRD will detect and alarm if gamma or neutron sources are present.

This sensitive device has a low false alarm rate for wearable search and can perform preliminary identification in just seconds, allowing further screening and investigation to be done as needed.

When a threat is found, you'll be alerted to it because of its rapid, visible, audible and tactile alarm settings. With the D3S PRD you can assess the situation immediately and discreetly, within seconds make an informed decision and then confirm the extent of the threat with D3S ID.

## Turn your PRD into a RIID at the touch of a button!

You can easily upgrade your D3S PRD to a D3S ID with a simple upgrade to your licence key to get full access to the most complete radiation detection solution in a single device with two modes of operation: PRD and RIID.

The upgrade enables you to switch back and forth between PRD and ID (RIID) modes at the press of a button, giving greater flexibility to meet challenges without having to carry any additional (heavier) equipment or call in specialist help.

## From PRD to RIID at the touch of a button



**PRD**

**One detector  
One smartphone  
Two modes of operation**

**RIID**

D3S ID is a powerful device with extended detection capabilities that enable safe monitoring in potentially high dose environments.

It is a complete dual RIID and PRD packaged in one single compact device the size of a smartphone yet has all the features needed by CBRN experts.

The D3S ID shares the same simple user interface of the PRD, with both visual and audio status updates and notifications. Results can be reported back discreetly and instantly using the 'Reachback Report' on the Android app. The D3S ID will also keep track of your detection and ID history.

Wearable hands-free use, faster than a conventional RIID, clear identification of isotopes and neutron source detection. Its high dose sensor capability enables detection of up to 1 Sv/h while its high sensitivity means it can rapidly identify low levels of radioactive material and possible shielded or concealed sources.

The device has a low false alarm rate for both wearable search and high sensitivity identification confirmation mode functions and the reachback feature allows instant sharing of data for efficient adjudication, making it the perfect all in one radiation detection system for CBRN professionals.

The D3S ID is discreet, wearable and a fraction of the price of other much larger RIIDs, meaning it's not only light on your belt, it's light on your budget.

## Who's using it?

It is used by personnel across a wide variety of sectors, including: customs and border patrols, police, first-responders, at airports, sea ports, event security and with environmental monitoring.

The D3S has been extensively tested and characterized and used in the field via the DARPA Sigma Program. More than 10,000 have been shipped worldwide and more than 4bn+ data points acquired.

## Performance

- Detection ID probability  $\geq 90\%$  at 12+ meters against nominal source activities
- Demonstrated ability to identify weak threats masked by high-level background radiation
- Android app turns D3S into a highly capable RIID with high dose capability
  - Near real-time ID with high accuracy (1 Hz update rate)
  - Discrimination between Medical, NORM, SNM, Industrial
  - Wearable, wide area search mode gives a low false alarm rate that exceeds the performance of current instruments for search
- Identification confirmation mode out performs the false alarm rate of conventional RIID instruments

Feature	D3S PRD	D3S ID
Gamma detector	✓	✓
Neutron detector	✓	✓
Voice annunciation upon detection	✓	✓
Alert classifications (NORM, Medical, Industrial, Special Nuclear Material)	✓	✓
Radionuclide library list	✓	✓
Search mode (real-time scan and identification, 1 Hz update rate)	✓	✓
High dose sensor up to 100 R/h (1 Sv/h)	✓	✓
Confirmation mode (scan time for identification of up to 5 minutes)	✗	✓
Reachback report (spectra and results sharing)	✗	✓
Historical alert view	✗	✓
Spectra storage in N42 file format	✗	✓
Field upgradeable to D3S ID	✓	N/A

# Specification

## D3S ID Isotope Library and Performance

- Library far exceeds ANSI and international standards
- 42 isotopes – 22 more than ANSI N42.34 standard
- Discriminates between Medical, NORM, Industrial and SNM classes
- 69 unique signatures which accounts for shielding and mixed configurations

### Notes:

\*Mandatory radionuclides as defined in ANSI N42.34

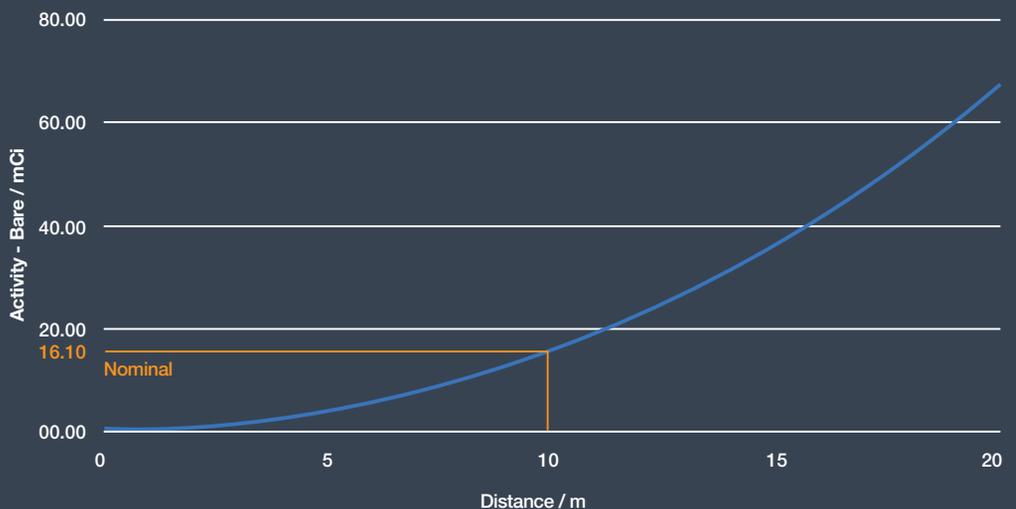
\*\*Beta+ emitting radionuclide

\*\*\*Beta- emitting radionuclide

\*\*\*\*Neutron emitting radionuclide

Americium-241*	Indium-111	Radium-226*
Antimony-124	Iodine-123	Scandium-46
Barium-133*	Iodine-131*	Selenium-75
Bromine-82	Iridium-192 in various shielding*	Sodium-22
Caesium-134	Lutetium-177	Strontium-90***
Caesium-137 in various shielding*	Lutetium-177m	Technetium-99m*
Californium-252****	Manganese-54	Thallium-201*
Chromium-51	Molybdenum-99	Thorium-232*
Cobalt-57*	Neptunium-237	Tin-113
Cobalt-60 in various shielding*	Palladium-109	Uranium-235*
Europium-152	Plutonium-239*	Uranium-238*
Fluorine-18**	Plutonium, reactor grade in various shielding*	Uranium, depleted in various shielding*
Gallium-67*	Plutonium, weapons grade in various shielding*	Uranium, highly enriched in various shielding*
Gold-198	Potassium-40*	Yttrium-88

### Detection variation with distance for Caesium-137 at 50 µR/h (0.5 µSv/h) (Meets ANSI 42.34)



## Detector specification

<b>Detector type</b>	Gamma and Neutron detection
<b>Gamma detector material</b>	CsI(Tl)
<b>Gamma detector volume</b>	1 in3 (16 cm3)
<b>Gamma energy range</b>	30 keV to 3 MeV
<b>Gamma sensitivity for Cs137</b>	5 cps/μR/h (500 cps/μSv/h) Photo peak 1.2 cps/μR/h (120 cps/μSv/h)
<b>Maximum throughput for gamma channel</b>	10,000 cps
<b>Maximum dose rate</b>	2.0 mR/h (20 μSv/h) at 662 keV (spectroscopic) 100 R/h (1 Sv/h) at 662 keV with high dose module
<b>Minimum dose rate</b>	1 μR/h (0.01 μSv/h)
<b>High dose module</b>	Pin diode
<b>Neutron detector material</b>	Non-3He
<b>Neutron detector</b>	9 cps in a 1 neutron per cm2 field
<b>Neutron detector gamma rejection</b>	Better than 10-7, meets ANSI N42.34 section 6.7
<b>Maximum throughput for neutron channel</b>	5,000 cps
<b>Communications</b>	Micro USB, Bluetooth®
<b>Operational battery life</b>	12 hours
<b>Operational temperature range</b>	-20°C to 50°C, meets ANSI N42.32 section 7.1, section 7.2, section 7.5
<b>Device size (excluding phone)</b>	5.2" x 3.1" x 0.9" (132 mm x 80 mm x 23.5 mm)
<b>Device volume (excluding phone)</b>	248 cm3
<b>Humidity</b>	Up to 93% RH ANSI N42.32 section 7.3
<b>Moisture/dust protection</b>	IP53 as per ANSI N42.32 section 7.4
<b>D3S weight (excluding phone)</b>	0.52 lbs (237 g)
<b>Battery</b>	1450 mAh Lithium polymer
<b>Charging</b>	Charging via USB or inductive charging
<b>External LEDs</b>	Visual detector status
<b>Device status indicator</b>	External LED

## Hardware tested to ensure compliance with the following standards

<b>Vibration</b>	ANSI N42.32 section 9.1
<b>ESD immunity</b>	ANSI N42.32 section 8.1
<b>Radiated emissions</b>	ANSI N42.32 section 8.4
<b>Drop test</b>	ANSI N42.32 section 9.2
<b>Impact (microphonics)</b>	ANSI N42.32 section 9.3
<b>Software</b>	
<b>Graphic user interface</b>	Android smartphone
<b>Spectra storage</b>	ANSI N42.42 compliant
<b>Spectra sharing</b>	Reachback Report

## Isotope Identification

<b>Confirmation mode complies with</b>	ANSI 42.34 within 30 seconds
<b>Search mode</b>	Isotope ID within 3 seconds
<b>Isotope ID</b>	Special isotope(s) detected Classification of isotopes (industrial, medical, NORM, SNM)
<b>False Alarm Rate</b>	Superior false alarm rejection (ANSI N42.32) for the gamma and neutron channels independently



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