

# Standalone detector for real-time in-field isotope ID



## Standalone next generation Isotope Identification

Low cost, high sensitivity and low signal to noise operational capability for fastest and most accurate isotope identification by a medium resolution detector system within a small form factor.

- Combines high sensitivity and cost savings of the D3S
- Leverage the power of cellular phone and Android technology
- Leverage the leading algorithm isotope ID technology that has been extensively tested via US Agencies



## The D3S Detector

Kromek has combined two of its leading technologies: the non-He3 compact thermal neutron detector and its world-leading gamma detector, into the ground-breaking all-new third generation 'Discreet Dual Detector', D3S.

The D3S hybrid gamma/neutron platform uniquely combines high sensitivity and small form factor together with a long-life battery power source making it the ideal portable instrument.

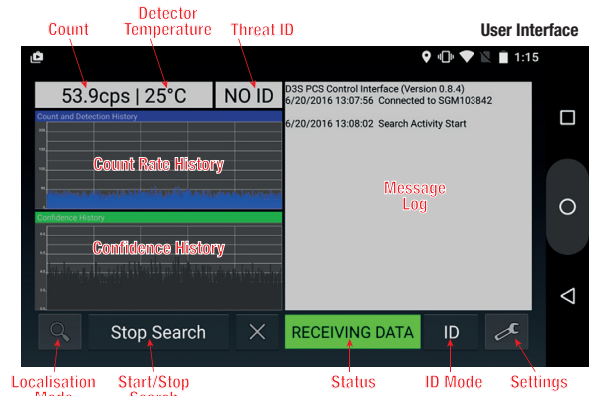
The D3S has been extensively characterised and used in the field via the DARPA Sigma Program, for which many thousands of detectors have been provided.

## The D3S-ID algorithm

The award winning algorithm provides a novel approach for radiological background estimation that improves the detection and discrimination capability of medium resolution detectors.

The algorithm provides significant enhancements in detection and identification of low activity shielded and masked threats and nuisance isotopes for a fast assessment of alarms. The algorithm has been extensively characterised both in DNDO and DARPA programs.

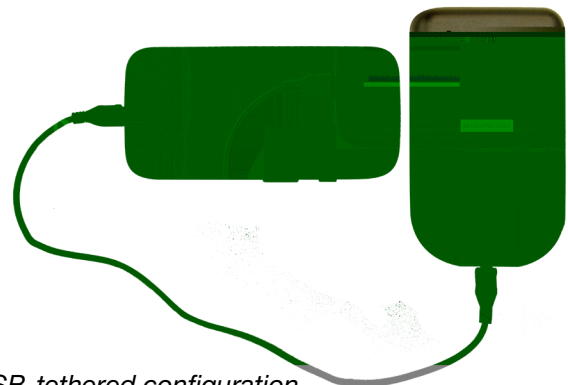
## D3S-ID App



- Connects to D3S via Bluetooth or USB
- Provides user interface to real-time ID alerts (3 sec rolling average spectrum with 1 Hz update)
- Includes Wide Area Search and Confirmation Mode functions

### User Interface Provides:

- Sensor operation
- Status and notifications (visual and audio)
- Count, Detection and ID history



USB-tethered configuration



## D3S-ID Isotope Library and Performance

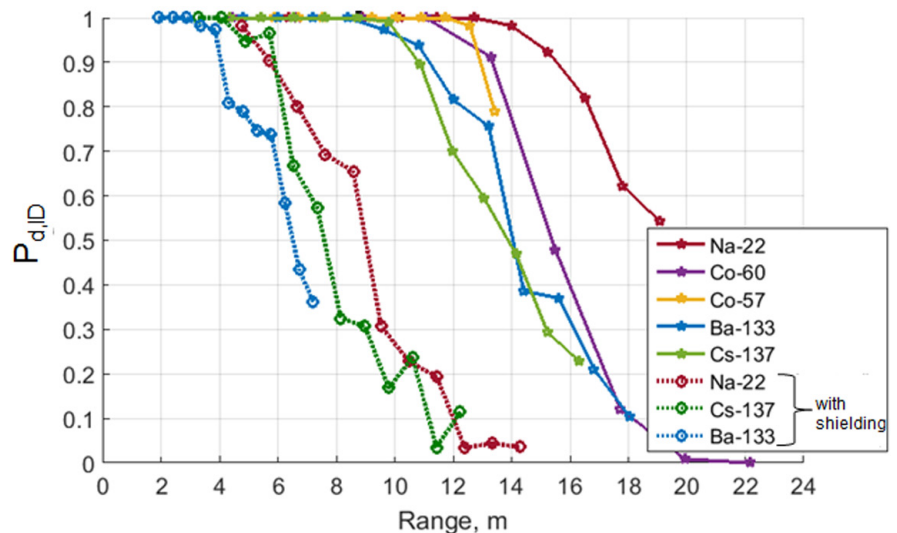
- Library driven by ANSI and international standards
  - Library is user adjustable with up to 60 unique signatures
  - 35 isotopes representing Medical, Industrial and SNM classes
  - the ID algorithm also accounts for shielding and mixed configurations

Am241	I125	Ra226
Ba133	I131	Se75
Co57	In111	Sn113
Co60	Ir192	Sr90/Y90
Cr51	K40	Tc99
Cs137	LEU bare	Th232
Cu67	Mo99	Tl201
DU	Na22	U233
F18	Np237	U235
Ga67	Pd109	U238
Ge68	Pu239	WGPu
HEU	Pu240	Y88
I123	RGPu	Yb169

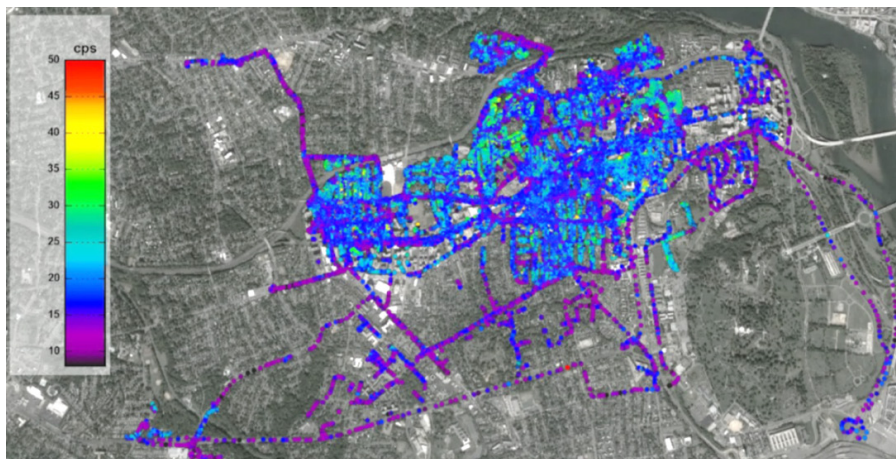
### Performance:

- $P_{d,ID} \geq 90\%$  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 mini RIID
  - Near real time ID with high accuracy (1 Hz update rate)
  - Discrimination between Medical, NORM, SNM, Industrial
  - CFAR typically set for operationally relevant 1 in 4 hours but can be extended with little expected loss of performance at CFAR of 1 in 36 detector hours
- Performance with 3 sec rolling spectrum (1Hz update) rate exceeds the capability of current RIIDs
- System can be tailored for different missions (wireless or wired)

ID Range Sensitivity Against Nominal Sources  
CFAR = 1 in 4 hrs, 3 sec rolling spectrum 1Hz update



## D3S-ID - The fastest and most accurate isotope ID



Easy upgrade path to a fully networked mapping solution

Specifications:	
Gamma detector	7% resolution @ 662 keV
Gamma energy range	30 keV to 3 MeV
Gamma sensitivity	500 cps/ $\mu$ Sv/h (5 cps/ $\mu$ R/h) for Cs137
Maximum throughput for gamma channel	10,000 cps
Dose rate	Up to 15 $\mu$ Sv/h @ 662 keV (1.5 mR/h)
Neutron detector	Sensitivity 12 cps/nv
Neutron detector gamma rejection	Better than $10^{-7}$
Maximum throughput for neutron channel	10,000 cps
Communications	Micro USB Bluetooth®
Operational battery life	12 hours
Operational temperature range	-20 to 50°C
Size	132mm x 80mm x 23.5mm (5.2"x 3.1"x 0.9")
Humidity	Up to 93% RH
Moisture/Dust	IP53
Weight	237 g (0.52 lbs)
Battery	1450mAh Lithium polymer
Charging	Inductive charging Charging via USB
External LED's	Visual detector status

Tested to ensure compliance with the following standards:

- Temperature as per ANSI N42.32 section 7.1
- Temperature shock as per ANSI N42.32 section 7.2
- Humidity as per ANSI N42.32 section 7.3
- Moisture/dust protection as per ANSI N42.32 section 7.4
- Cold temperature start-up as per ANSI N42.32 section 7.5
- Vibration as per ANSI N42.32 section 9.1
- Neutron channel gamma rejection as per ANSI N42.34 section 6.18
- ESD immunity as per ANSI N42.32 section 8.1
- Radiated emissions as per ANSI N42.32 section 8.4
- Drop test as per ANSI N42.32 section 9.2
- Impact (microphonics) as per ANSI N42.32 section 9.3

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