ORTEC®

Micro-Detective® and Micro-Detective-DX™

Next Generation ULTRA-LIGHT Portable Hand-Held Radioisotope Identifiers

Benefits

- High resolution gamma spectroscopy with confirmatory neutron detection.
- Definitive answers to the detection of illicit nuclear materials (SNM) trafficking in seconds, in a battery operated instrument.
- Fast, Simple and ULTRA-Reliable Classification of NORM, Medical, Industrial, SNM and Natural Isotopes, shielded and unshielded.
- ANSI N42-34 compliant.
- Simple to Operate: Bright, Clear Displays, touch sensitive screens, intuitive menus.
- Multiple uses (e.g.): Hand-Held Nuclide Identifier, Emergency Whole-Body Counter, Ad-hoc Portal Monitor, Search System, Food Monitor.
- Gamma-Ray and Neutron Search Modes.
- SNM Search Mode™ finds SNM sources in the presence of other sources.
- Rugged design for rough handling: dust and water proof (IP67 capable).
- Compatible with Ge-SS search system.
- USB and Wireless 802.11 Communications.
- Built in GPS.
- Secure Digital (SDIO) slot.

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The Micro-Detective is truly the next generation portable nuclide identifier. The success of the ORTEC Detective family of nuclide identifiers is well known; hundreds of these are in daily use across the world in the fight against illicit nuclear trafficking and other illegal acts. They have become known as the “gold standard” for identification.

In developing the Micro-Detective, ORTEC engineers carefully examined the feedback received from hundreds of customer interactions. At 15.2 lbs, the Micro-Detective is a ***substantially smaller and lighter package*** than other Detective models, but retains all the best features of the pre-existing product. It incorporates additional functions as standard and implements several packaging improvements. The display is greatly improved; the package is now highly water and dust resistant.

It is important, however, to understand that Micro-Detective utilizes the same approach to nuclide identification that has proven so successful in the Detective family with the same size HPGe detector. In other words, its performance as an identifier is already well understood and documented.

An Impressive Pedigree

ORTEC Detectives are already deployed widely in the battle against illicit nuclear trafficking. Hundreds are being used worldwide by (among others):

Departments of Homeland Security
Departments of Defense
National Security Organizations
Bomb Disposal Teams
Emergency Response Teams
Customs and Border Control
Navy, Army and Air Forces
International Atomic Energy Agency
Emergency Management Teams
Civil Support Teams
Police Departments
Nuclear Safeguards Organizations
Nuclear Fuel Manufacturers
Nuclear Researchers
US NNSA second line of defense “Megaports” initiative

The Micro-Detective provides the same impressive identification capabilities.

Software Features

- Three “Search Modes”:
  - Gamma/neutron total count rate
  - SNM Search mode
  - Sliding average “monitor” mode
- User choice of identification schemes
  - Classify Mode (by nuclide type: “nuclear, natural, medical, industrial, etc.”)
  - ANSI mode
  - Time preset or continuous count selectable to match CONOPS
  - Suspected Nuclides (not in preset mode)
  - More sensitive LCX mode for SNM detection
- Background collect feature eliminates reporting of background nuclides.
- “Smart” spectrum stabilizer ensures optimum results, even with hard-to-analyze spectra.
- ANSI N42.42 format storage of spectra

Models

- **Micro-Detective**: Lightweight, Portable HPGe Identifier with Gamma and Neutron detection.
- **Micro-Detective-DX**: “Gamma only” version of the Micro-Detective.

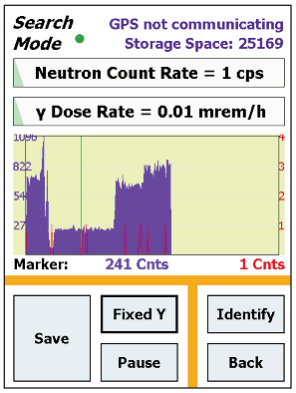
Operational Capabilities

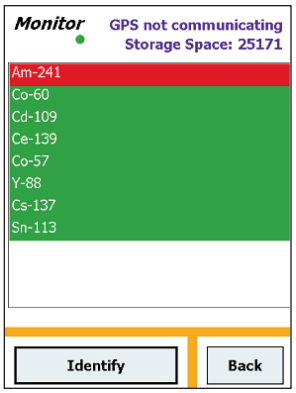
(all models except where noted)

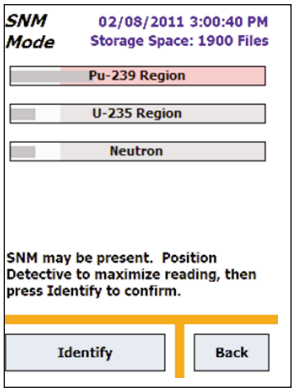
SEARCH MODES: Gamma and neutron (if applicable) count rates are presented as a time tracking strip chart. Neutron counts are displayed in red and gamma counts in blue.

MONITOR MODE: Detective collects one spectrum per second and runs the ID algorithm against an 8 second sliding average. More sensitive to sources which move relative to the instrument. Monitor mode is a valuable search method, but is also useful, for example, in ad-hoc portal monitoring applications.

SNM Search Mode: SNM Search mode is designed to help avoid false negatives when determining SNM. It helps in finding the point of maximum count rate which COULD be consistent with SNM.







Key regions of the spectrum are monitored which are critical to the determination of both U-235 (the key constituent of HEU) and Pu-239. The peak region confidence level is displayed in the form of a bar graph. A high and steady reading indicates that "something" is present which is worthy of more investigation. Once the maximum reading has been located, the "confirm" key initiates the full identification algorithm.

SNM Search mode is an INDICATOR of SNM but should always be followed by the confirmatory ID to avoid false positives. In combination, SNM Search and ID modes minimize BOTH false negatives and false positives.

GAMMA DOSE RATE: Gamma Dose Rate is monitored by the HPGe detector and by an internal compensated GM tube. The dose rate is displayed at all times. Dose rate units may be chosen as μSv/hr or mR/hr.

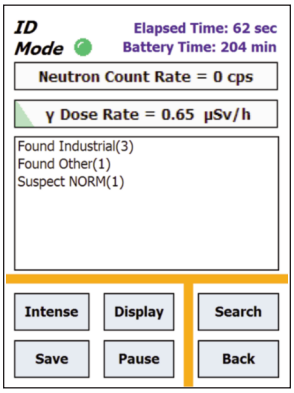
NEUTRON COUNT RATE (if applicable): Neutron Count Rate is displayed continuously. The data can be quickly saved and transmitted for further offsite analysis.

GPS Position Information: An internal GPS receiver displays GPS coordinates which may be saved along with spectrum data for future use.

Storage of Data (spectrum, search data, ID results): To internal RAM and removable SD card.

Computer Interfacing: USB connection to laptop. Spectral transfer by MicroSoft® ActiveSync. Remote control via MicroSoft "remotedsp.exe" (supplied). Wi-fi (802.11) communication is optionally available.

All models feature a large, bright and clear LCD Display with touch-sensitive screen. The figure shows the main operator screen. Gamma and neutron count rate and gamma dose rate are displayed continuously both numerically and in bar graph form. The battery life remaining is shown at the top.



Operating Modes

In response to customer requests, Detective instruments can now operate in two modes "Classify" and "ANSI".

Classify Mode: The user presses the Identify button and the instrument gathers data until manually stopped, without preset. During the acquisition, suspected nuclide classification messages appear, such as "Suspect Industrial 1", meaning the presence of one industrial nuclide is suspected. As the count continues and confidence levels increase, this might change to "Found Industrial 1" or disappear as better statistics determine the previously suspected nuclide was not, in fact, present. Clicking on the "Found" or "Suspect" message gives a listing of which nuclides were actually found (or suspected) by name.

ANSI Mode: This mode is similar to classify mode, but dispenses with the classification, and presents nuclide names directly, both suspect and found.

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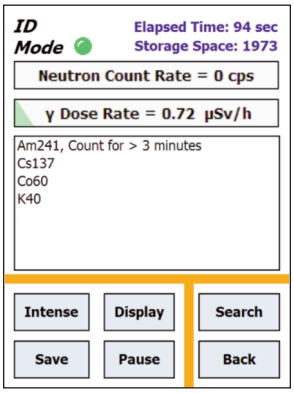
Preset Time: This is to allow for CONOPS* in which it is required to count for a preset time, for example 60 seconds. At the end of the preset period, only what has been found is reported, no suspects are reported. The operator can request a count time extension, if desired, adding multiples of the original preset period.



LCX (Low-Confidence Expert) ID Mode: LCX mode is password protected. LCX denotes “Low Confidence-Expert,” and is intended for expert users. This identification mode displays suspected threat alarms and identifications at a lower confidence level than the normal mode. This results in more hits on suspected threat nuclides.

Instrument Calibration: The instrument is calibrated prior to shipment from the factory. The energy calibration may be checked and adjusted with any known source with a clean gamma ray between 0 and 3 MeV. A higher energy is recommended. Cs-137 is often used. Calibration can be manual or automatic. Background collection is now a required part of calibration. By allowing for activities already in the background, the system will no longer report nuclides detected in the background. These IDs on former versions sometimes lead to user-confusion. The background must be updated on a schedule which is chosen by the privileged user.

SMART Stabilizer: The “smart stabilizer” stabilizes the gain very precisely on the 1460 keV peak of K-40, if present. The smart part is that if there is no K-40 present or if Eu-152 is detected, which could interfere with the K-40 peak, the stabilizer setting is held but not adjusted until “normal” conditions return. Even though the Detective is a highly stable instrument, the smart stabilizer allows accurate determination of more complicated mixed spectra.

*Concept of Operations.

Classify Mode

The form of the primary ID messages is:

"Found CLASS(#)" or "Suspect CLASS(#)" where “CLASS” is

Medical
Industrial
NORM
Bremsstrahlung
Other
Nuclear Uranium
Nuclear Plutonium
Nuclear Neptunium

And "#" is the number of nuclides of that class identified.

The following table lists the Detective Library v8.5 radionuclides according to their categories in the “Classify” ID mode.

Industrial

Am-241	I-126
Am-241 (unshielded)	I-126 (shielded)
Cs-137	I-132
Ho-166m	I-133
Ho-166m (shielded)	I-134
Ir-192	I-135
Ir-192 (shielded)	Kr-87
W-187	Kr-88
Ac-227	Kr-88 (shielded)
Ag-110m	Mn-52
Ar-41	Mn-56
As-72	Nb-92m
Au-198	Nb-94
Ba-133	Nb-95
Ba-140	Nb-96
Be-7	Nb-96 (shielded)
Bi-212 (Th-232/U-232 daughter)	Nd-147
	Pa-231
Br-77	Pb-203
Ca-47	Pr-144
Cd-115	Ra-223
Ce-144	Rh-105
Cm-242	Ru-103
Cm-243	Ru-97
Cm-244	Sb-124
Co-55	Sb-124 (shielded)
Co-57	Sb-125
Co-57 (shielded)	Sb-127
Co-60	Sr-85/Kr-85
Cs-134	Tc-96
Hf-181	Te-132
Hg-203	Th-229

Th-230
Tm-171
W-188/Re-188

Medical

F-18
I-125
Lu-177
Lu-177m
Mo-99
Pd-103
Se-75
Sm-153
Sm-153 (shielded)
Tc-99m
Xe-133
Ac-225
As-74
Ce-139
Ce-141
Co-58
Ga-67
Ga-67 (shielded)
Ge-68/Ga-68
I-123
I-123 (shielded)
I-124
I-131
I-131 (shielded)
In-111
Lu-172
Na-24
Rb-83
Rb-86
Ru-106/Rh-106
Sc-46
Sr-82/Rb-82
Sr-89
Tl-201
Tl-204
Tm-170
V-48
Xe-133m
Yb-169
Zn-62
Zn-65
Zr-95

NORM

La-138
Ra-226
Bi-214 (Ra-226 daughter)
K-40
Lu-176
Th-232

Other

Cr-51
Cu-64
Eu-152
Gd-159
La-140
Mn-54
Neutrons on Fe
Neutrons on Hydrogen
Unknown Peak
Unknown/Beta emitter
Xe-131m
At-211
Bi-207
Br-76
Br-76 (heavily shielded)
Br-76 (shielded)
Cd-109
Co-56
Co-56 (shielded)
Eu-154
Eu-155
Eu-156
Fe-59
Ga-64
Ga-64 (shielded)
Gd-153
Ho-166
Ir-194 (shielded)
Na-22
Neutrons
Os-194/Ir-194
Po-210
Sn-113
Ta-182
Tl-200
Tl-202
Xe-135
Y-88

Bremsstrahlung

Beta emitter

Nuclear Uranium

Enriched Uranium	U-235
HEU	U-238
U-232	186 keV peak present
U-233	2614 keV peak present

Nuclear Plutonium

Pu-239	375/414 peak present
Pu-238	Am-241 (shielded)

Nuclear Neptunium

Np-237

Classify Mode Messages
The following explains the criteria for selected Classify ID Display Mode messages.

HEU (highly enriched uranium)**:** This message is displayed if the major lines of uranium are detected and the ratios of the intensities of the lines indicates the U-235 content to be above about 70%.

Am241 (unshielded) in the “Industrial” category: This message is displayed if the 59 keV peak is located. It could mean that an Am-241 source such as a smoke detector is present. Move closer to the source and/or count longer. This will allow the higher-energy gamma rays to accumulate in the spectrum, in case plutonium is also present.

Unknown Peak and **Unknown/Beta Emitter**: This indicates the gamma count rate is higher than can be accounted for based on the peaks in the library. The implication is that either an unexpected nuclide or a beta emitter is present (beta emitters typically producing counts over a broad range of energies). Move closer to the source and count longer to determine the nature of the suspect item. If another ID is found, then the Unknown Peak or the Unknown/Beta Emitter ID are suppressed.

“Found Nuclide” Screen Messages
RDD Detected: This message is posted when estimated activity is >100 mCi, whether the activity is from threat or innocent nuclides. The gamma count-rate and dose-rate meters on the Survey Mode and ID Mode screens display a flashing red background and extremely high count and dose rates.

ANSI Mode Messages
The table is divided according to the threat category used to determine ID background color in Monitor Mode and on the Found and Suspect Nuclide reports, e.g., green for innocent IDs, yellow for LCX-mode suspects, and red for threats. NB: if desired and under password protection, the color coding, and therefore the threat classification can be disabled.

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Identification	Classification
Innocent	
Ac-225	Medical
Ac-227	Industrial
Ag-110m	Industrial
Am-241 (unshielded)	Industrial
Ar-41	Industrial
As-72	Industrial
As-74	Medical
At-211	Other
Au-198	Industrial
Ba-133	Industrial
Ba-140	Industrial
Be-7	Industrial
Beta emitter	Bremsstrahlung
Bi-207	Other
Bi-212 (Th-232/U-232 daughter)	Industrial
Bi-214 (Ra-226 daughter)	NORM
Br-76	Other
Br-76 (heavily shielded)	Other
Br-76 (shielded)	Other
Br-77	Industrial
Ca-47	Industrial
Cd-109	Other
Cd-115	Industrial
Ce-139	Medical
Ce-141	Medical
Ce-144	Industrial
Cm-242	Industrial
Cm-243	Industrial
Cm-244	Industrial
Co-55	Industrial
Co-56	Other
Co-56 (shielded)	Other
Co-57	Industrial
Co-57 (shielded)	Industrial
Co-58	Medical
Co-60	Industrial
Cr-51	Other
Cs-131	Medical
Cs-134	Industrial
Cs-137	Industrial
Cu-64	Other
Cu-67/Ga-67	Medical
Eu-152	Other
Eu-152	Other
Eu-154	Other
Eu-156	Other
F-18	Medical
Fe-59	Other
Ga-64	Other
Ga-64 (shielded)	Other
Ga-67	Medical
Ga-67 (shielded)	Medical
Gd-153	Other
Gd-159	Other
Ge-68/Ga-68	Medical
Hf-181	Industrial
Hg-203	Industrial
Ho-166	Other
Ho-166m	Industrial
Ho-166m (shielded)	Industrial
I-123	Medical
I-123 (shielded)	Medical
I-124	Medical
I-125	Medical
I-126	Industrial
I-126 (shielded)	Industrial
I-131	Medical
I-131 (shielded)	Medical
I-132	Industrial
I-133	Industrial
I-134	Industrial
I-135	Industrial
In-111	Medical
Ir-192	Industrial
Ir-192 (shielded)	Industrial
Ir-194 (shielded)	Other
K-40	NORM
Kr-87	Industrial
Kr-88	Industrial
Kr-88 (shielded)	Industrial
La-138	NORM
La-140	Other
Lu-172	Medical
Lu-176	NORM
Lu-177	Medical
Lu-177m	Medical
Mn-52	Industrial
Mn-54	Other
Mn-56	Industrial
Mo-99	Medical
Na-22	Other
Na-24	Medical
Nb-92m	Industrial
Nb-94	Industrial
Nb-95	Industrial
Nb-96	Industrial
Nb-96 (shielded)	Industrial
Nd-147	Industrial

Os-194/Ir-194	Other
Pa-231	Industrial
Pb-203	Industrial
Pd-103	Medical
Po-210	Other
Pr-144	Industrial
Ra-223	Industrial
Ra-226	NORM
Rb-83	Medical
Rb-86	Medical
Rh-105	Industrial
Ru-103	Industrial
Ru-106/Rh-106	Medical
Ru-97	Industrial
Sb-124	Industrial
Sb-124 (shielded)	Industrial
Sb-125	Industrial
Sb-127	Industrial
Sc-46	Medical
Se-75	Medical
Sm-153	Medical
Sm-153 (shielded)	Medical
Sn-113	Other
Sr-82/Rb-82	Medical
Sr-85/Kr-85	Industrial
Sr-89	Medical
Ta-182	Other
Tc-96	Industrial
Tc-99m	Medical
Te-132	Industrial
Th-229	Industrial
Th-230	Industrial
Th-232	Thorium
Tl-200	Other
Tl-201	Medical
Tl-202	Other
Tl-204	Medical
Tm-170	Medical
Tm-171	Industrial
V-48	Medical
W-187	Industrial
W-188/Re-188	Industrial
Xe-127	Industrial
Xe-131m	Other
Xe-133	Medical
Xe-133m	Medical
Xe-135	Other
Y-88	Other
Y-91	Industrial
Yb-169	Medical
Zn-62	Medical
Zn-65	Medical
Zr-95	Medical

Suspect (LCX Mode only)

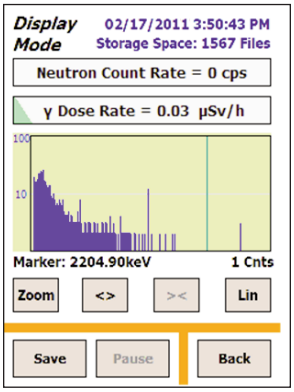
186 keV peak present	Uranium
2614 keV peak present	Uranium
375/414 peak present	Plutonium

Threat

Am-241	Industrial
Am-241 (shielded)	Plutonium
Enriched Uranium	Uranium
HEU	Uranium
Neutrons	Other
Neutrons CR	Neutron
Neutrons on Fe	Other
Neutrons on Hydrogen	Other
Np-237	Neptunium
Pu-238	Plutonium
Pu-239	Plutonium
U-232	Uranium
U-233	Uranium
U-235	Uranium
U-238	Uranium
Unknown Peak	Other
Unknown/Beta emitter	Other

Display

All models feature the same bright and clear VGA resolution display with touch sensitive operator screen. Menu navigation is highly intuitive. The radionuclide gamma-ray spectrum may be displayed and manipulated (e.g., vertical scale, zoom) like a conventional multichannel analyzer. Y-axis units are now displayed.



Gamma-Ray Identification Performance Data for Uranium and Plutonium

(Typical values based on data obtained from actual measurements by ORTEC personnel.)

Single Sources

Unless otherwise stated, these data were taken at a standard dose rate from the source of 500 nSv/h measured with a calibrated dose rate meter at the instrument detector face according to ANSI N42.34. When an absorber was present, the dose rate at the detector was measured THROUGH the absorber.

Unshielded and Shielded Uranium: DU, U-NAT, LEU, HEU
The time to identify as uranium, either unshielded or shielded by up to 5 mm steel, is <2.5 sec). For LEU and HEU samples, the type ("LEU" or "HEU") is also reported in <2.5 sec). LEU and HEU samples shielded by 1.6 mm lead are identified as Uranium in <2.5 sec.

Unshielded and Shielded Plutonium: Weapons Grade (WG), Reactor Grade (RG) (~60–93% ^{239}Pu)
Time to identify as Pu, unshielded or shielded by up to 5 mm steel or 10 mm lead: <13 seconds for all types of Pu (with Cd filter if high Am content). For WG Pu the type "WG Pu" is also reported in less than <35 sec.

Mixtures

In all cases, the mixture consists of 500 nSv/h of the "mask" nuclide, added to the specified quantity of uranium or plutonium. The "dose ratio threshold" is defined to be the standard 500 nSv/h dose rate from the mask in ratio to the smallest dose rate from U or Pu detectable in the time stated.

Uranium at 500 nSv/h in the presence of Cs-137 or Co-57 mask (unshielded)
Time to identify as uranium <2.5 sec. For LEU and HEU, the type ("LEU" or "HEU") is also reported in <2.5 sec.

Uranium Dose ratio threshold for 60 second measurement in the presence of Cs-137 or Co-57 mask (Dose from mask: Dose from uranium)
>7:1 for identification as uranium unshielded
>3:1 shielded 5 mm steel.
>2:1 for reporting as LEU or HEU unshielded
>1.5:1 shielded 5 mm steel.

Plutonium at 500 nSv/h in the presence of Ba-133 mask
Time to identify as Pu <20 sec, unshielded or shielded by 5 mm steel or 10 mm lead. Identified type as RG Pu or WG Pu in <100 sec.

Plutonium Dose ratio threshold for 5 minute measurement in the presence of Ba-133 mask
>6:1 for identification as Pu unshielded, >4:1 shielded by 5 mm steel or 10 mm lead.
>1:1 for reporting as WG Pu or RG Pu unshielded or shielded by 5 mm steel or 10 mm steel (with Cd filter if high Am content).

Analysis Algorithm Improvements

Detective series instruments have proven highly resistant to false positive and false negative results. Recent improvements to the Detective algorithms have enhanced this already excellent performance still further. In Version 3, the implementation of the background subtraction has removed the reporting of nuclides identified in the background. While technically not an incorrect result, reporting of background nuclides was considered undesirable by some experts. The smart stabilizer has improved the analysis of some difficult masking scenarios.

Specifications

OPERATION MODES

SEARCH Scanning mode for location of radioactive sources, with audio alert using an external ear piece. Both neutron and gamma search is simultaneous; speed settings 0.1 to 50 seconds/point

SNM Search Mode™ Nuclide-specific search mode for U-235, Pu-239 and neutron counts. Ba-133 surrogate detection may be turned on for training purposes. Bar graph display of nuclide confidence level. Aid to Identify mode.

MONITOR Mode The instrument collects one spectrum per second and runs the ID algorithm against an 8 second sliding average. This mode is more sensitive to sources which move relative to the instrument.

LCX "Low confidence Expert" Mode.

IDENTIFY Gamma Proprietary scheme for identification and classification of radionuclides. Background subtraction.

ANSI Mode: See nuclide list above.

Classify Mode:

Nuclides classified according to:
Industrial
Medical
Natural (NORM)
Nuclear

These classifications are based on an internal, fixed library according to ANSI N42.34. Customized libraries for specific applications can be supplied by special order.

Remote Mode Detective V3 instruments can participate as nodes within the Detective-Remote mobile system. (http://www.ortec-online.com/download/Detective-Remote.pdf)

Dose Rate Visual over range indication and continuous audible alarm, user settable. Over-ride alarm at dose rates >10,000 μSv/hr.

DETECTORS

Internal HPGe Detector
Crystal Nominal Dimensions: 50 mm diameter x 40 mm deep. P-type high-purity germanium. Coaxial construction.

Cryostat/Cooler: "Hardened" cryostat, with high reliability, low power Stirling Cooler. The cryostat design is such that the Micro-Detective may be switched off at any time and power subsequently re-applied, without having to wait for a full thermal cycle (full warm up before cool down), as is normal practice with a HPGe detector system. This feature greatly increases system availability during measurement campaigns.

Digital Noise Suppression: LFR Filter.

Gamma Dose Rate Detector Two detectors determine the gamma dose rate over a wide range from <0.05 μSv/h to >10,000 μSv/h, a dose-rate range of around six decades. For low dose rates, below ~20 μSv/h, the dose rate is determined from the Ge detector spectrum. For dose rates above this value, the internal compensated GM tube is used. Instrument switches between the two automatically.

Dose rate uncertainty <(–50% to +100%); continuous audible alarm at dose rates >10,000 μSv/h (fixed maximum threshold), user settable threshold below this.

Neutron Detector Module (non -DX model only) Single ^{3}He tube: 4" active length, 0.5" diameter, 20 atm He^{3} fill pressure. High Density Polyethylene moderator.

DIGITAL MCA AND DATA PROCESSOR

Display VGA 640 x 480 TFT sunlight readable touchsensitive, operate with finger or stylus.

Data Processor Marvel 806 MHz XScale.

Data Storage (Spectrum, Search Data, ID Results) To internal RAM and removable SD card.

Computer Interfacing USB connection to laptop. Spectral transfer by Microsoft® ActiveSync. Remote control via Microsoft "remotedsp.exe" (supplied). Wi-fi (802.11) communication software optionally available.

GPS Internal NMEA compliant WAAS capable.

Digital MCA with Internal Storage of Multiple Spectral Data. "Smart" digital spectrum gain stabilizer.

Digital Noise Suppression LFR Filter.

Conversion Gain 8k channel.

Maximum Number of Stored Spectra Unlimited on removable media.

DISPLAYS AND MENUS

Main Screen

Gamma Count Rate Bar Graph 20 kcps full scale.

Dose Rate Bar Graph 10 mSv/hr full scale, flashes on over range.

Status Lines:

WARNING!! High Dose Rate — Displayed when Dose rate exceeds 10 mSv/hr.

Detector is Warm — Displayed when crystal temperature is above working limit.

Bias Supply Error — Displayed if any power supply is bad.

WARNING!! Low Battery.

Search Mode (Gamma/Neutron) Dwell times 0.1 – 50 seconds per point. Over-range warning.

SNM Search Mode™ Nuclide-specific search mode for U-235 and Pu-239. Bar graph display of nuclide confidence level.

Identify Nuclide ID and calssification.

"Intense" shows the most intense lines list, which is a continuously updating list of the 12 best peaks currently detected. The nuclides and energies are based on the internal nuclide library. The rank is based on the confidence value for the peak.

"Save" Saves the spectrum. Format choices: ORTEC ".CHN", ORTEC ".SPC" and ANSI N42.42.

"Display" brings up the spectral display. The spectrum may be manipulated via the arrow keys and various accelerator keys for cursor movement. Energy and channel contents are displayed with the spectrum.

Advanced Setup Password protected.

Calibration Check Manual or Automatic Calibration Check. Automatic may be triggered by interval or time of day. Instrument is supplied calibrated from factory.

View Data Acquisition Parameters Reports instrument status.

PHYSICAL SPECIFICATIONS

Maximum Overall Dimensions (including handle, Ge detector end cap and shock absorbers)
14.7" L x 5.75" W x 11" H
(37.4 cm L x 14.6 cm W x 27.9 cm H)

Height with handle removed 9.23" (23.4 cm).

Weight 15.2 lbs (6.9 kg).

Internal Battery Lithium Ion. >3 hours of battery life at 25°C when HPGe detector is cold. <4 hour time to charge.

External Battery Battery lifetime may be extended indefinitely by the use of external battery packs. DETECTIVE-OPT-15 is recommended, weighs less than 3.25 lbs and extends lifetime to >10 hrs.

Input Power 10 to 17 V DC from battery or DC power supply (universal mains supply included). Battery charger circuit is inside instrument .

Power Usage Strongest during cool down: <100 Watt. While charging Battery: 5A nominal. Cold with fully charged battery <2A.

External Power DC Input and battery Charge Input. 2.5 mm coaxial connector with locking screw on collar.

Temperature
Operation Range: 0°C to 40°C.
Relative Humidity: <90% at 35°C, non-condensing.

Instrument Enclosure is sealed against ingress of dust and water. All perforations are sealed by rubber plugs (connectors, memory cards, etc.).

Communications Ports
External Connectivity to System
- 1 SD (Secure Digital) card slot (3.3 V).
- 1 USB connection for "ActiveSync" capability or MCA operation with external computer (ActiveSync and remote display software included).
- WiFi 802.11 communication software optional.
- 1 Audio headphone jack.

Cool Down Time The high reliability cooler is designed for continuous operation. Between making measurements the unit is powered from a DC supply, car battery or other high capacity device. The cooler life is expected to exceed 50,000 hours continuous operation. Initial cool down time depends on ambient temperature, but is typically <12 hours at 25°C.

Communication Software

The Micro-Detective is a member of the ORTEC *CONNECTIONS* family. Remote MCA control and individual spectrum download, even over a network, is achieved simply, by the use of ORTEC *CONNECTIONS* products such as MAESTRO MCA Emulation software.

Multiple spectra may be block-transferred from the instrument controller to external PCs by the use of Microsoft ActiveSync. Third party products such SOTI "Pocket Controller Enterprise" may be used to implement the 802.11 wireless feature to provide remote wireless control of the complete instrument.

Software for the Micro-Detective

The Micro-Detective is fully supported by the latest versions of the highly successful MAESTRO MCA Emulator as well as the well-known ORTEC Gamma Spectroscopy Packages such as GammaVision for generalized HPGe spectrum analysis, PC/FRAM and MGAHI for Pu and U isotopic ratio analysis and ISOPlus for in-situ waste assay analysis.

The integral USB connection in the instrument hardware provides full PC control, real-time live MCA display, fast data transfer of single and multiple spectra to the PC, and full ORTEC *CONNECTIONS* network support. Separate brochures are available on request.

PLEASE NOTE: MAESTRO is supplied as part of packages containing "PKG" in the model number, or it can be purchased separately at a later date.

Ordering Information

Model	Description
MICRO-DETECTIVE	Lightweight, Portable HPGe Identifier (Gamma and Neutron). Includes GPS, mains adapter, battery cable, shoulder strap, softside carry case and Microsoft ActiveSync software.
MICRO-DET-PKG-1	Includes MICRO-DETECTIVE Lightweight, Portable HPGe Identifier (Gamma and Neutron), GPS, mains adapter, battery cable, shoulder strap, Microsoft ActiveSync software, MAESTRO software, and hardside wheeled transport case.
MICRO-DETECTIVE-DX	Lightweight, Portable HPGe Identifier (Gamma ONLY). Includes GPS, mains adapter, battery cable, shoulder strap, softside carry case and Microsoft ActiveSync software.
MICRO-DET-DX-PKG-1	Includes MICRO-DETECTIVE-DX Lightweight, Portable HPGe Identifier, GPS, mains adapter, battery cable, shoulder strap, Microsoft ActiveSync software, MAESTRO software, and hardside wheeled transport case.
MICRO-DET-OPT-1	Rugged, waterproof, wheeled transport case.
DETECTIVE-OPT-15	Ultra battery extender.

Micro-Detective Upgrades

A range of performance, usability, and reliability upgrades are available for all existing ORTEC Micro-Detectives including full warranty upgrade options. Contact ortec.info@ametek.com for details.

Micro-Detective® and Micro-Detective-DX™

Next Generation ULTRA-LIGHT Portable Hand-Held Radioisotope Identifiers

Specifications subject to change
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