Micro-Detective
Ultra-Light, High-Fidelity Hand-Held Radioisotope Identifier
• Accurate nuclide identification based on high resolution gamma spectroscopy with confirmatory neutron detection.
• Definitive detection of illicit special 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.
• Multiple uses (e.g.): Hand-Held Nuclide Identifier, Emergency Whole-Body Counter, Ad-hoc Portal Monitor, Search System, Food Monitor.
• Gamma-Ray, SNM and Neutron Search Modes.
• Rugged design for rough handling: dust and water proof (IP67 capable).
• USB and Wireless 802.11 communications; built in GPS.
• Wireless Mobile MCB Server software.
• Secure Digital (SDIO) slot.

Latest Improvements
• Operating time of up to 5 hours on single battery.
• “Snap-open” battery door for rapid battery exchange with minimal down-time.
• New improved silent running, low-power cryocooler.
• Detective-Pro Integration Tool Kit sends information directly to remote, third-party applications.

Introduction
The latest version Micro-Detective products build on the ORTEC pedigree of HPGe nuclide identifiers which began with the introduction of the ORTEC Detective in response to the 9-11 aftermath and the realization that it was vital to provide an effective solution to the problem of potential illicit trafficking of nuclear materials by terrorists.

Since 2004, the ORTEC Detective product line capabilities have broadened in scope and now cover a range from large installed freight monitoring systems, search systems and the light weight Micro-Detective products for in-field hand-held operation. All share the same ORTEC HPGe technology and advanced Detective analysis algorithms.

In the latest version Micro-Detective and Micro-Detective-DX instruments, new technology provides an impressive increase in the lifetime of the internal battery: up to 66% longer or 5 hours typical operation on a single charge. A new “snap open” battery door allows an exhausted battery to be replaced in seconds and the instrument re-started with a full battery with almost no interruption to operation.

A new generation low-power cryocooler provides “silent running” operation and improved operational lifetime.

A Long and Distinguished Pedigree

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

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

There are two models of Micro-Detective available:

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

Both models of the Micro-Detective feature the same compact, light weight and rugged hardware. A 50 mm diameter HPGe crystal in a “hardened” cryostat is cooled by an integrated low-power Stirling-cycle cryocooler. The latest revision Micro-Detective features a new cooler offering reduced levels of acoustic noise and vibration, and longer operation life. The hardened cryostat is entirely free of conventional molecular sieve allowing the instrument to be turned off or on at any point in the detector cool-down or warm-up cycle without risk. This is impossible with conventional HPGe cryostat systems which require careful temperature cycling procedures to avoid damage.

A built-in digital MCA system and powerful data processor are included. All models feature the same bright and clear VGA resolution display, readable in direct sunlight, with a 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.

Gamma and neutron count rate and gamma dose rate are displayed continuously both numerically and in bar graph form.

In the latest version, the Micro-Detective internal battery provides enough power for up to 5 hours of operation and is easily replaced in seconds, allowing continuous in-field operation.

At just under 16 lbs. in weight, the Micro-Detective sets a world record for portable, high resolution nuclide identifiers, by a wide margin.

Analysis Capabilities

Since initial introduction of the first Detective instruments, identification performance capabilities have iteratively been improved through taking part in many independent performance testing programs. These programs are sponsored by governmental and international organizations, such as the US DTRA, the IAEA, and most recently the on-going international ITRAP-plus 10 testing program.

Micro-Detective performance has continued to advance as a result of these rigorous test programs. As the needs and best practices of deploying organizations have also evolved, Detective software features have expanded to meet these new requirements.
Summary of Operational Features

(refer to Technical Specifications for more detail)

- 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.

Calibration and Stabilization

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 a required part of calibration. By allowing for activities already in the background, the system will not report nuclides detected in the background. 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. 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.
Software for the Micro-Detective

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 the included MAESTRO-PRO Advanced Spectroscopy software.

MAESTRO-Pro is an advanced spectroscopy application which includes support for multiple languages, extensive calibration features, N42 spectrum file support, peak fit and analysis results display, expanded automation functions, and more.

The Micro-Detective is fully supported by the latest versions of other ORTEC Gamma Spectroscopy Packages such as GammaVision for generalized HPGe spectrum analysis, FRAM and MGAHI for Pu and U isotopic ratio analysis and ISOPlus for in-situ waste assay analysis.

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.

Mobile MCB Server

The Mobile MCB Server software application enables any ORTEC portable instrument installed with a PDA to communicate wirelessly with ORTEC software applications such as MAESTRO, MAESTRO-PRO, GammaVision, and Detective-Remote. The Mobile MCB Server acts like a wireless version of the USB connection, allowing users to control and monitor any portable spectrometer through a wireless network.

Users can develop their own applications through the use of the optional A11 tool kit.
Micro-Detective

Technical Specifications: Hardware

RADIATION DETECTORS
The Micro-Detective includes three separate radiation detector subsystems:

A high resolution high purity germanium (HPGe) detector for nuclide identification.

A compensated GM Tube for dose rate.

A moderated neutron detector (absent on DX model).

HPGe Detector
- P-type high-purity germanium. Coaxial construction.
- Crystal Nominal Dimensions: 50 mm diameter x 33 mm (±10%) deep.
- 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.
- HPGe 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. Initial cool down time depends on ambient temperature, but is typically <12 hours at 25°C.

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 tube: 4” active length, 0.5” diameter. High Density Polyethylene moderator.

DIGITAL MCA AND DATA PROCESSOR

Display
- VGA 640 x 480 TFT sunlight readable touch sensitive, 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.

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.
  - WiFi 802.11 communication software.
  - Wireless Mobile MCB Server software
  - 1 Audio headphone jack.

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

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.

Storage of Data
- (spectrum, search data, ID results) To internal RAM and removable SD card. Maximum Number of stored spectra unlimited on removable media.

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, 14.4 V, 6.2 Ah, 89 Wh, nominal. Up to 5 hours of battery life at 25°C when HPGe detector is cold. <4 hour time to charge. Internal battery is easily swapped through removal of snap shut battery door.

External Battery Option
- Battery lifetime may be extended indefinitely by the use of external battery packs. EXT-BAT-MICRO 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. External battery charger option also available.

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: –10°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.).
Technical 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: Neutron counts are displayed in red and gamma counts in blue.

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.

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. An aid to Identify mode.

LCX (Low Confidence Expert) ID Mode
Intended for expert users. Displays suspected threat alarms and identifications at a lower confidence level than ANSI and Classify modes. Results in more hits on suspected threat nuclides. Password protected.

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

ANSI Mode
See following nuclide list. Preset Time counting allows for CONOPS in which it is required to count for a preset time, e.g., 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.

Classify Mode
Nuclides classified according to: Industrial, Medical, Natural (NORM), and Nuclear. Classifications are based on an internal, fixed library according to ANSI N42.34. Customized libraries for specific applications can be supplied by special order.

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

Neutron Count Rate
Displayed continuously. Data can be quickly saved and transmitted for further off site analysis.

GPS Position Information
Internal GPS receiver displays GPS coordinates which may be saved along with spectrum data for future use.
Technical Specifications: Instrument Nuclide ID Messages: 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 table lists the Detective Library v8.5 radionuclides according to their categories in the “Classify” ID mode.

Classify Mode Message Rationale

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.
### Technical Specifications: Instrument Nuclide ID Messages: ANSI Mode

The table below 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.

<table>
<thead>
<tr>
<th>Identification</th>
<th>Classification</th>
<th>Suspect (LCX Mode only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ac-225</td>
<td>Medical</td>
<td>Sc-46</td>
</tr>
<tr>
<td>Ac-227</td>
<td>Industrial</td>
<td>Se-75</td>
</tr>
<tr>
<td>Ag-110m</td>
<td>Medical</td>
<td>Sm-153</td>
</tr>
<tr>
<td>Am-241 (unshielded)</td>
<td></td>
<td>Sm-153 (shielded)</td>
</tr>
<tr>
<td>Ar-41</td>
<td>Industrial</td>
<td>Sn-113</td>
</tr>
<tr>
<td>As-72</td>
<td>Industrial</td>
<td>Sr-82/Rb-82</td>
</tr>
<tr>
<td>As-74</td>
<td>Medical</td>
<td>Sr-85/Kr-85</td>
</tr>
<tr>
<td>At-211</td>
<td>Other</td>
<td>Sr-89</td>
</tr>
<tr>
<td>Au-198</td>
<td>Industrial</td>
<td>Ta-182</td>
</tr>
<tr>
<td>Ba-133</td>
<td>Industrial</td>
<td>Tc-96</td>
</tr>
<tr>
<td>Ba-140</td>
<td>Industrial</td>
<td>Te-132</td>
</tr>
<tr>
<td>Be-7</td>
<td>Industrial</td>
<td>Th-229</td>
</tr>
<tr>
<td>Beta emitter</td>
<td>Bremsstrahlung</td>
<td>Th-230</td>
</tr>
<tr>
<td>Bi-207</td>
<td>Other</td>
<td>Th-232</td>
</tr>
<tr>
<td>Bi-212 (Th-232/U-232 daughter)</td>
<td>Industrial</td>
<td>Ti-200</td>
</tr>
<tr>
<td>Bi-214 (Ra-226 daughter)</td>
<td>NORM</td>
<td>Ti-201</td>
</tr>
<tr>
<td>Br-76</td>
<td>Other</td>
<td>Ti-202</td>
</tr>
<tr>
<td>Br-76 (heavily shielded)</td>
<td>Other</td>
<td>Ti-204</td>
</tr>
<tr>
<td>Br-77</td>
<td>Industrial</td>
<td>Tm-170</td>
</tr>
<tr>
<td>Ca-47</td>
<td>Industrial</td>
<td>V-48</td>
</tr>
<tr>
<td>Cd-109</td>
<td>Other</td>
<td>W-187</td>
</tr>
<tr>
<td>Cd-115</td>
<td>Industrial</td>
<td>W-189/Re-188</td>
</tr>
<tr>
<td>Ce-139</td>
<td>Medical</td>
<td>Xe-127</td>
</tr>
<tr>
<td>Ce-141</td>
<td>Medical</td>
<td>Xe-132</td>
</tr>
<tr>
<td>Ce-144</td>
<td>Industrial</td>
<td>Xe-133</td>
</tr>
<tr>
<td>Cm-242</td>
<td>Industrial</td>
<td>Xe-133m</td>
</tr>
<tr>
<td>Cm-243</td>
<td>Industrial</td>
<td>Xe-135</td>
</tr>
<tr>
<td>Cm-244</td>
<td>Industrial</td>
<td>Y-88</td>
</tr>
<tr>
<td>Co-55</td>
<td>Other</td>
<td>Y-91</td>
</tr>
<tr>
<td>Co-56</td>
<td>Other</td>
<td>Yb-169</td>
</tr>
<tr>
<td>Co-56 (shielded)</td>
<td>Other</td>
<td>Zn-82</td>
</tr>
<tr>
<td>Co-57</td>
<td>Industrial</td>
<td>Zn-65</td>
</tr>
<tr>
<td>Co-57 (shielded)</td>
<td>Industrial</td>
<td>Zr-95</td>
</tr>
<tr>
<td>Co-58</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Co-60</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Cr-51</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Cs-131</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Cs-134</td>
<td>Industrial</td>
<td></td>
</tr>
<tr>
<td>Cs-137</td>
<td>Industrial</td>
<td></td>
</tr>
<tr>
<td>Cu-64</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Cu-67/Ga-67</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Eu-152</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Eu-154</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Eu-156</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Fe-58</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Fe-89</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Ga-64</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Ga-64 (shielded)</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Ga-67</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Ga-67 (shielded)</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Gd-153</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Gd-159</td>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Ge-68/Ga-68</td>
<td>Industrial</td>
<td></td>
</tr>
<tr>
<td>Hf-181</td>
<td>Industrial</td>
<td></td>
</tr>
<tr>
<td>Hg-203</td>
<td>Industrial</td>
<td></td>
</tr>
</tbody>
</table>

#### Threat
- U-235
- U-238
- U-239
- U-233
- U-235
- U-233
- U-238
- Other
- Neutrons on Hydrogen
- Neutrons on Fe
- Neutrons
- Neutrons CR
- Neutrons Other
- Neptunium
- Plutonium
- Uranium
- Enriched Uranium
- HEU
- Other
- Plutonium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Uranium
- Neptunium
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% 239Pu)
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).
# Micro-Detective

## Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICRO-DETECTIVE</td>
<td>Lightweight, Portable HPGe Identifier (Gamma and Neutron). Includes GPS, mains adapter, battery cable, shoulder strap, MAESTRO-PRO software, and softside carry case.</td>
</tr>
<tr>
<td>MICRO-DET-PKG-1</td>
<td>Includes MICRO-DETECTIVE Lightweight, Portable HPGe Identifier (Gamma and Neutron), GPS, mains adapter, battery cable, shoulder strap, MAESTRO-PRO software, and hardside wheeled transport case.</td>
</tr>
<tr>
<td>MICRO-DETECTIVE-DX</td>
<td>Lightweight, Portable HPGe Identifier (Gamma ONLY). Includes GPS, mains adapter, battery cable, shoulder strap, MAESTRO-PRO software, and softside carry case.</td>
</tr>
<tr>
<td>MICRO-DET-DX-PKG-1</td>
<td>Includes MICRO-DETECTIVE-DX Lightweight, Portable HPGe Identifier, GPS, mains adapter, battery cable, shoulder strap, MAESTRO-PRO software, and hardside wheeled transport case.</td>
</tr>
<tr>
<td>MICRO-DET-OPT-1</td>
<td>Rugged, waterproof, wheeled transport case.</td>
</tr>
<tr>
<td>MICRO-DET-ACC-BAT</td>
<td>Lithium-ion battery.</td>
</tr>
<tr>
<td>MICRO-DET-ACC-CHGR</td>
<td>Standalone battery charger and calibrator kit.</td>
</tr>
</tbody>
</table>

Further battery charging and upgrade options are available.

Note: This brochure relates to instruments with the following revision levels:
- Micro-Detective Rev.2.B or later
- Micro-Detective-DX Rev.1.F or later