

The Premium Portable High Resolution Gamma Spectrometer  
for In-Situ Measurements



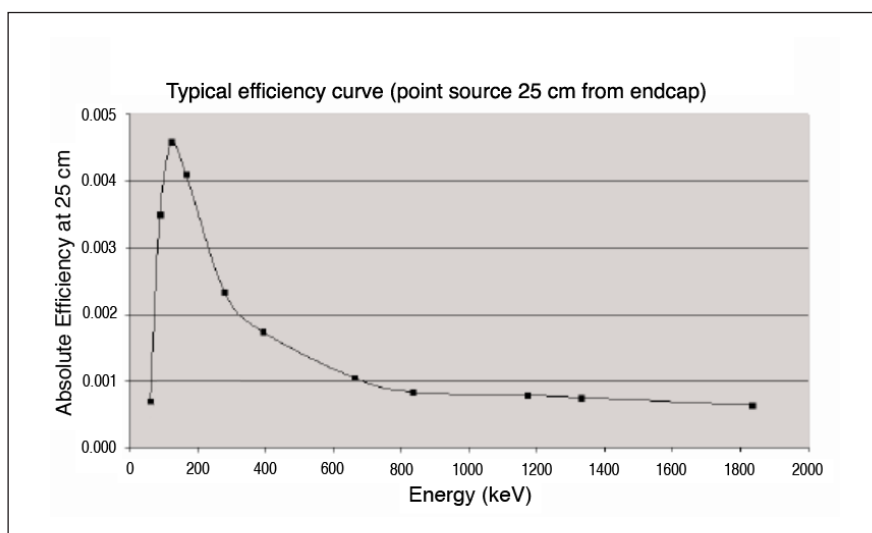
- Large P-Type High Purity Germanium Detector (65 x 50 mm) >40% Relative Efficiency
- High Reliability Stirling-Cycle Cooler with Hardened Cryostat
- Digital Signal Processing and active low frequency noise reduction (LFR)
- Rugged design for harsh environments (IP65 compliant)
- Compact and Light-Weight (15.4 lbs / 6.98 kg)
- Long Battery Life (8 hours) with two hot swappable batteries
- Large (4.3 inch) High Resolution touch screen easily readable in sunlight
- Internal and Removable File Storage (>100,000 spectra)
- Computer Control via USB, Ethernet, and Wi-Fi compatible with ORTEC Applications
- Mobile Phone, Tablet, and Computer application mirroring on iOS, Android, and Windows platforms

# Detective-X-TS

## Detective-X “Trans-SPEC Edition”

The DETECTIVE-X-TS is a portable, all-inclusive, high resolution gamma spectrometer for in-situ measurements. It can be used as a stand-alone instrument to collect spectra in the field or controlled by a computer connected via USB, Ethernet, or Wi-Fi using applications such as MAESTRO-Pro (included), GammaVision, Isotopic, and others.

The DETECTIVE-X-TS is physically identical to the popular DETECTIVE-X Radioisotope Identifier which is considered the “Gold Standard” for Mission Critical Detection and Identification. Similar to ORTEC’s legacy TRANS-SPEC-100T and MICRO-TRANS-SPEC instruments, the DETECTIVE-X-TS is specifically intended for use as a more economical portable high resolution gamma spectrometer for field measurements rather than an automatic isotopic identifier. The DETECTIVE-X-TS model includes warranted resolution performance and MCA Emulation software, but excludes the Isotopic Identification applications included with the other DETECTIVE-X models (Detective X, RAPiD, and Sleuth). The DETECTIVE-X-TS can be upgraded to the DETECTIVE-X 3 MeV and 8 MeV models along with a current Dose Rate calibration.



### Why DETECTIVE-X-TS?

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### Application Features

**Main Spectrum Display:** Log/Lin, Zoom, Region of Interest, Start, Stop, Clear Acquisition, and Save Spectrum.

**Peak/ROI Data:** Centroid, FWHM, Start/End Channel, Gross and Net Area and Count Rate.

**Configurable Spectrum Marker Data:** Energy, Channel, Counts.

**Configurable Status Lines:** Two of any of the following: Live Time, Real Time, Live Time Remaining, Real Time Remaining, Battery Time Remaining, Count Rate, Count Rate in ROI.

**MCA Controls:** ADC Conversion Gain with Upper and Lower Level Discriminators, Coarse and Fine Amplifier Gain, Base Line Restore (Auto, Fast, Slow), Gain and Zero Stabilizers, High Voltage On/Off.

**Acquisition Presets:** Live Time, Real Time, ROI Peak, and ROI Integral.

**State of Health Status:**  $\pm 12$  V, +3.3 V, Detector Temperature, Cooler Body Temperature, Cold Tip Temperature, High Voltage.

**Security:** Password protected User/Admin modes, Lock /Hide Spectrum Display during acquisition.

**Energy Calibration:** Quadratic fit of energy versus channel.

The screenshot displays the Detective-X-TS software interface. At the top, a spectrum plot shows a blue histogram with a vertical green line at 1338.78 keV. The plot includes a y-axis from 10 to 1000 (scaled by 1E4) and an x-axis from 0 to 1000. The plot is titled 'RT: 02:10:34, LT: 02:09:38' and 'Marker: 8191 Chn = 1338.78 keV'. Below the plot are control buttons: 'R 1', 'Clr', '<<', '>>', 'Zoom', '<>', '<<', '>>', 'Lin', 'Start', 'Clear', 'Save', and 'Menu'.

The 'Peak Info' table is shown below the plot:

Peak Info	
Peak Centroid	1156.33 keV
FWHM	1.91 keV
ROI Start Channel	7016
ROI End Channel	7521
Gross Area	20291
Net Area	15821 $\pm$ 623 (3.9%)
Gross Count Rate (cps)	2.61
Net Count Rate (cps)	2.03

The 'MCA Settings' screen includes buttons for 'High Voltage', 'Amplifier', 'Presets', 'ADC Settings', 'Stabilizer', 'State Of Health', and 'Back'.

The 'State Of Health' screen displays the following status:

Parameter	Status
+12 V	OK
-12 V	OK
+3.3 V	OK
Detector Temperature	OK
Cooler Body Temperature	OK
Cold Tip Temperature	OK
High Voltage	OK

The 'General Settings' screen includes buttons for 'Set User Pwd', 'Set Admin Pwd', 'Admin Mode', 'Lock Display', 'Calibrate', 'Set PHA Mode', 'Status/Marker', and 'Back'.

The 'Energy Calibration' screen shows a table of energy versus channel data:

Energy (keV)	Channel
59.5400	344.2400
88.0300	522.0100
122.0700	732.6900
165.8500	1003.8600
279.1700	1705.2900
391.6900	2401.8700
661.6600	4073.0900

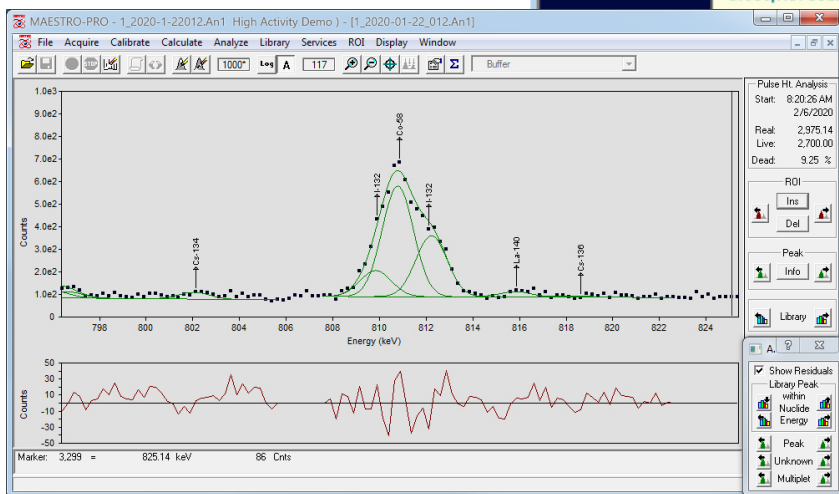
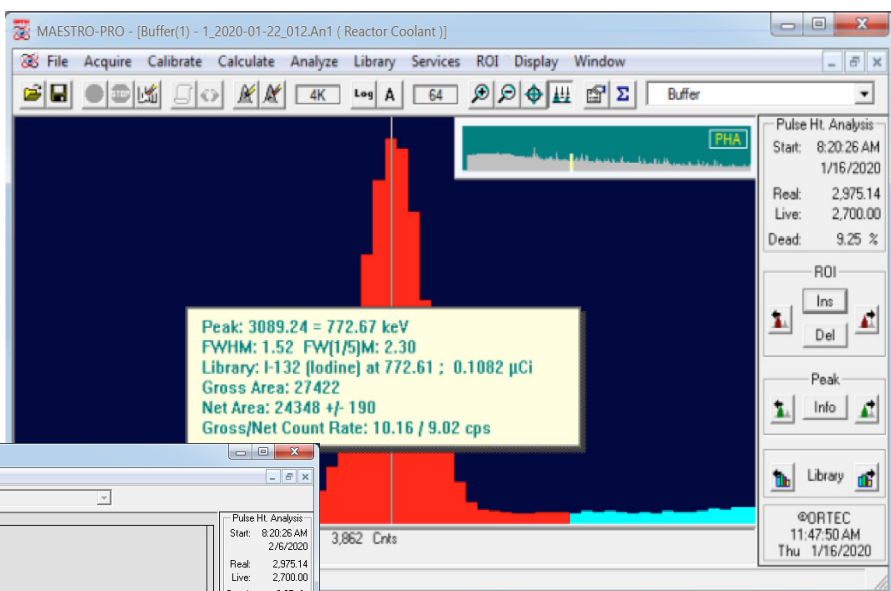
Below the table are buttons for 'Add', 'Edit', 'Delete', 'Calibrate', and 'Back'. The quadratic fit parameters are displayed as: Intercept: 3.8060, Slope: 0.16296, and Quad: 2.510380e-009.

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## Detective-X “Trans-SPEC Edition”

### External Application Compatibility

The Detective-X-TS is compatible with all ORTEC CONNECTIONS-based applications such as MAESTRO, MAESTRO-Pro, GammaVision, Isotopic, Renaissance, and the A11 Programmer’s Toolkit for a broad range of application uses.



Diameter

Height

Standoff

Detector Height

Detector 1 of 1

Name: No detector Type: P Type

Crystal Dimension (in mm)  
 Length: 30 Diameter: 85

Detector Configuration

Orientation:  Front  Side  Top Weighting: 1.0

Detector Height: 60.9600 cm Offset from Edge: 91.4400 cm

Detector Standoff ( Distance from Collimator Front to Inner Container )  
 Standoff: 88.9000 cm Calculate ...

Calibration File: ...

PBC File: ...

Detector Collimator

No Collimator

Depth (Recess): 0 cm

Thickness: 0 cm

Inner Diameter: 0 cm

Collimator Material  
 Pb  Fe  W

Cancel < Back Next > Finish

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## Detective-X “Trans-SPEC Edition”

### TECHNICAL SPECIFICATIONS

#### DETECTOR / COOLER

**Crystal:** P-type high-purity germanium (HPGe). Coaxial construction. Nominally 65 mm diameter x 50 mm length.

**Relative Efficiency:**  $\geq 40\%$  typical (ANSI/IEEE 325-1996).

**Resolution:**  $\leq 1600$  eV @ 122 keV and  $\leq 2.3$  keV @ 1332 keV (FWHM Warranted at optimum settings).

**Peak Shape:** 1.9 typical (FWTM/FWHM).

**Cryostat and Cooler:** “Hardened” cryostat, with highreliability, low-power Stirling cooler. The cryostat design is such that the unit 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). This feature greatly increases system availability during measurement campaigns.

**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 device. Initial cool down time depends on ambient temperature, but is typically 6 hours at 25°C.

#### DIGITAL MCA AND DATA PROCESSOR

**Digital Low Frequency Noise Suppression:** “LFR Filter”.

**Conversion Gain:** Up to 16k channels.

**Display:** 4.3” WQVGA (480 x 272 pixels) sunlight readable, touch sensitive, operate with finger or stylus.

**Data Processor:** FREESCALE I.MX535 operating at 1 GHz.

**Data Storage Media:** Internal RAM and removable low profile USB Flash drive. The unit is shipped with a USB Flash drive which can store over 100,000 spectra.

**File Format:** ORTEC CHN and SPC spectrum formats.

**Computer and Device Interfacing:** USB, Ethernet TCP/IP v4 connections via standard RJ45 Ethernet connection (10/100 Mbps, auto-sensing), Wi-Fi (IEEE 802.11a/b/g/e/i/h/j standards and IEEE 802.11n with protected access protocols including WPA and WPA2). Mobile MCB Server enables remote control through ORTEC CONNECTIONS-based applications, such as MAESTRO, GammaVision, etc.. Wisemo is used for device application mirroring and control.

#### PHYSICAL

**Maximum Overall Dimensions:** (including handle and Ge detector endcap) 15.5 in L x 6.25 in W x 8.25 in H (39.5 cm L x 16 cm W x 21 cm H).

**Weight:** 15.4 lbs (6.98 kg).

**Internal Battery:** 2 Rechargeable Lithium Ion. 98 Wh each, nominal. Approximately 8 hours of battery life at 25°C when HPGe detector is cold. <4 hour time to charge. Internal battery is easily swapped.

**External Battery:** Battery lifetime may be extended indefinitely by the use of optional external battery packs. An external military battery (Model 2590) weighs less than 3.25 lbs and extends lifetime to >16 hrs.

**Input Power:** 12 to 17 V DC from battery or DC power supply (universal mains supply included).

**Power Usage:** Highest during cool down and charging battery: <100 Watt. Cold with fully charged battery <35 W.

**Operation Range:** Temperature: -20°C to 50°C. Relative

Humidity: 95% non-condensing.

**Instrument Enclosure:** IP65 Sealed against ingress of dust and water. All perforations are sealed by rubber plugs (connectors, memory cards, etc.).

# Detective-X-TS

## Detective-X “Trans-SPEC Edition”

### Ordering Information

Model	Description
DETECTIVE-X-TS	Ultra-Light-Weight, Portable, High Efficiency, Standard HPGe Spectrometer. Includes mains adapter, vehicle power cable, USB flash drive, shoulder strap, MAESTRO-PRO software and wheeled hardsided case. <b>Does not include</b> Radioisotopic Identification applications (Detective X, Sleuth, and RAPiD).
DETECTIVE-X-TS-UPG-3	DETECTIVE-X-TS Upgrade to full DETECTIVE-X 3 MeV model including Radioisotopic Identification applications (Detective X, Sleuth, and RAPiD) and Dose Rate Calibration. Requires return to factory.
DETECTIVE-X-TS-UPG-8	DETECTIVE-X-TS Upgrade to full DETECTIVE-X-8 8 MeV model including Radioisotopic Identification applications (Detective X, Sleuth, and RAPiD) and Dose Rate Calibration. Requires return to factory.

### Accessories

Model	Description
DETECTIVE-X-ACC-BAT	Lithium-Ion Battery.
DETECTIVE-X-ACC-DUAL-CHGR	Standalone dual battery charger and calibrator.
DETECTIVE-X-ACC-VEHCHGR	Vehicle powered adapter cable.
DETECTIVE-X-ACC-PS	Universal AC mains power supply.
DETECTIVE-X-ACC-2590-CABLE	Battery Cable for connection to Military 2590 battery.
DETECTIVE-X-ACC-RCFILTER	Low Energy Gamma Filter.
DETECTIVE-X-ACC-COL-W	Tungsten Collimator 4 mm thick.
DETECTIVE-X-ACC-COL-ST	Steel Collimator 4 mm thick.
DETECTIVE-X-ACC-TRANSPORTCASE	Wheeled Transport Case.
DETECTIVE-X-ACC-USBFLASH	USB Mini Flash Drive.
DETECTIVE-X-ACC-WIFI-ADAPTER	WiFi 802.11 B/G/N USB Adapter.
DETECTIVE-X-ACC-SHOULDER-STRAP	Shoulder Strap with Stylus and Retractable Cord.
DETECTIVE-X-ACC-MANUAL	Manual.
DETECTIVE-X-OPT-RFSECURE	Removal of WiFi, Bluetooth, and GPS signal capability from Detective-X-TS.
EXT-BAT-X	Ultra Battery Extender. Includes battery, charger and cable for Detective-X-TS.
M-1-T2-X-VERT	Variable length tripod and vertical mounting bracket for Detective-X-TS
M-1-T2	Variable length tripod
M-1-T2-BRKT-X-VERT	Vertical mounting bracket for Detective-X-TS on M-1-T2 tripod

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Specifications subject to change  
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