X-MET 8000 Expert Geo — Technical Datasheet and Equipment Overview

Classification: Handheld XRF Analyzer — Geochemistry, Mining, and Environmental Screening

Executive Summary

The X-MET 8000 Expert Geo is a hardware-reconfigured variant of the X-MET 8000 platform, purpose-built for geochemistry, mining exploration, and environmental soil screening. Every component — from the 25 mm² BOOST™ detector to the Prolene measurement window and integrated GPS — is selected and optimised for field-based elemental analysis of rocks, ores, soils, and sediments.

Key value proposition: **Detection of 40+ elements including Rare Earth Elements (REE), ppm-level sensitivity in geological matrices, and integrated GPS geotagging — the only X-MET 8000 configuration engineered for geoscience applications.**

1. Physical and Environmental Specifications

Parameter	Specification
Dimensions (W x L x H)	93 x 210 x 272 mm
Weight (with 2 batteries)	1.5 kg
Ingress protection	IP54
Durability standard	MIL-STD-810G
Operating temperature	-10°C to +50°C
Max. sample temperature (standard)	100°C
Max. sample temperature (with HERO™)	400°C
Operating time	10–12 hours (dual battery)

The 1.5 kg weight and compact form factor enable all-day field use across rugged terrain. The MIL-STD-810G construction withstands the vibration, shock, and environmental extremes encountered at remote exploration sites and open-cut mines.

2. X-Ray Tube: 50 kV

Parameter	Value
Anode material	Rhodium (Rh)
Max. tube voltage	50 kV

Parameter	Value
Max. power	4 W
Max. anode current	200 µA

Why 50 kV Is Required for Geochemistry

Rare Earth Element excitation: The K-absorption edges of light REE (La = 38.9 keV, Ce = 40.4 keV, Nd = 43.6 keV, Sm = 46.8 keV) require a tube voltage of at least 45–50 kV for efficient K-line excitation. Lower voltage configurations cannot reliably excite these elements, making REE analysis impossible.

Pathfinder element excitation: Geochemical pathfinders associated with mineralisation (As, Se, Mo, Ag, Sn, Sb, W, Au, Hg, Pb, Bi, U) require high tube voltage for efficient K- or L-line excitation, particularly for reliable detection at ppm concentrations in complex matrices.

Penetration capability: Geological samples typically present rough, oxidised, or moist surfaces. The 50 kV tube provides the penetration depth necessary for representative analysis through surface irregularities.

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3. Detector: Large Area SDD with BOOST™ Technology

Parameter	Specification
Type	Silicon Drift Detector
Active area	25 mm²
Energy resolution	~130–160 eV at Mn Kα (5.9 keV)
Cooling	Thermoelectric (Peltier)
Signal processing	BOOST™ patented electronics

What Is BOOST™

BOOST™ is Hitachi High-Tech's patented signal processing technology that enhances SDD performance through:

Signal amplification: The BOOST™ electronics chain increases the signal-to-noise ratio by approximately an order of magnitude compared to standard processing. This directly translates to improved detection limits.

Extended energy range: Optimised pulse processing enables efficient operation across the full energy spectrum — from low-energy light elements (Mg, Al, Si) to high-energy K-lines of heavy elements.

Temperature stability: BOOST™ algorithms compensate for thermal drift and electronic noise, maintaining result stability under changing field conditions.

Practical Impact of 25 mm² Active Area

Parameter	Standard SDD (~10 mm²)	Expert Geo (25 mm²)
Geometric collection efficiency	Baseline	~2.5x higher
Measurement time (fixed precision)	60–90 seconds	30–60 seconds
Detection limit (fixed time)	Higher	~1.6x lower (1/√2.5)

For geochemical screening, the 25 mm² detector with BOOST™ enables reliable determination of trace elements at single-digit ppm levels within 30–60 second measurements — the difference between detecting an anomaly and missing it entirely.

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4. Element Range: Mg – U + REE

Full Elemental Coverage

The Expert Geo covers the entire periodic table from magnesium (Z=12) to uranium (Z=92), including Rare Earth Elements.

Rare Earth Element Capability

Group	Elements
Light REE	La, Ce, Pr, Nd, Sm
Heavy REE	Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Associated	Y (yttrium)

REE determination is critical for:

- REE deposit exploration and resource estimation
- Process control at REE processing facilities
- Environmental monitoring (REE are toxic at elevated concentrations)

Geochemical Pathfinder Elements

Deposit Type	Pathfinder Elements
Gold	As, Sb, W, Mo, Bi, Cu, Pb, Zn, Ag, Se, Te
Copper-porphyry	Cu, Mo, Ag, Au, As, Zn, Pb
Lead-zinc	Pb, Zn, Ag, Cd, Ge, Ga, In
Uranium	U, Th, Pb, As, V, Mo, Se
Nickel	Ni, Co, Cr, Cu, Pt, Pd

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5. Geochemical Calibration

Calibration Type

Standardless FP with light elements and REE support — Fundamental Parameters method extended for reliable determination of Mg, Al, Si, P, S, K, Ca, and the full REE suite in geological matrices.

Soil Calibration Capability

The standard soil calibration simultaneously determines **up to 40 elements** in soil, sediment, and sludge samples:

Category	Elements
Major	Mg, Al, Si, P, S, K, Ca, Fe
Trace	Ti, V, Cr, Mn, Co, Ni, Cu, Zn, As, Se
Heavy metals	Ag, Cd, Sn, Sb, Ba, Hg, Tl, Pb, Bi, U
REE	La, Ce, Nd, Eu, Gd, Dy, Yb, Lu (and others)

Regulatory Compliance

- **EPA Method 6200** — field portable XRF screening of soils
- **RCRA metals** — As, Ba, Cd, Cr, Pb, Hg, Se, Ag
- **CERCLA** — contaminated site assessment

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6. Measurement Window: Prolene

Why Prolene

The Expert Geo is fitted with a **Prolene (polypropylene) window** instead of the Shield Window used on the standard metal-analysis configurations.

Prolene properties:

- Maximum transmission for soft X-rays from light elements (Mg, Al, Si, P, S)
- Minimal absorption in the low-energy region
- Sufficient durability for field conditions

This is critical for geochemistry because light elements (Mg, Al, Si, Ca, K) are the major constituents of rocks and soils. Their accurate determination is essential for correct matrix correction and reliable quantification of trace components.

Quick-Swap compatible — tool-free field replacement in under 60 seconds.

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7. Integrated GPS

Parameter	Specification
Type	Integrated GPS receiver
Position accuracy	3.0 m CEP (circular error probable)

Parameter	Specification
Function	Automatic coordinate logging per measurement

Applications

Geochemical mapping: Each measurement point is georeferenced, enabling direct import into GIS platforms (ArcGIS, QGIS) for anomaly mapping and contour generation.

Contaminant delineation: GPS-tagged measurements allow precise delineation of contaminated zones and tracking of remediation progress.

Sample tracking: Exact revisit coordinates for follow-up sampling or confirmatory analysis.

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8. Camera

- Resolution: 640 x 480 px
- Magnification: 6x
- Technology: CMOS

The camera documents the analysed soil or rock surface, providing visual context for result interpretation and reporting.

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9. Power System

Parameter	Specification
Battery type	Li-Ion, 6.2 Ah
Batteries supplied	2
Operating time	10–12 hours
Charger	110/230 V, 50/60 Hz (universal)
Charge time	~8 hours

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10. Data Management

Parameter	Specification
Internal storage	16 GB
Result capacity	100,000+ with spectra and images
Export formats	CSV, tamper-proof PDF
Cloud	ExTOPE Connect synchronisation

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11. Connectivity

- USB 2.0
- Bluetooth 2.0 + EDR
- Wi-Fi 802.11 b/g
- GPS — integrated (standard)

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12. Field Accessories

Accessory	Application in Geochemistry
Bipod	Stability for extended measurements (>30 s)
Benchtop Stand	Laboratory-mode analysis of cup/pouch samples
Light bench stand with shield	Powder sample analysis in the field
Telescopic pole	Access to inaccessible locations (cliffs, cuttings)
Bluetooth printer	Sample label printing on-site
Spare Prolene windows	Field replacement stock

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13. Positioning: Expert Geo vs. Optimum Geo vs. Expert

Parameter	Optimum Geo	Expert Geo
Tube voltage	45 kV	**50 kV**
Detector	10 mm² SDD + BOOST™	**25 mm² SDD + BOOST™**
REE determination	No	**Yes**
Measurement window	Shield Window	**Prolene Window**
Camera	Optional	**Standard**
3 mm collimator	Not available	**Optional**
Warranty	3 years	2 years

Why Expert Geo Cannot Be Replaced by Standard Expert

Parameter	Expert	Expert Geo
Detector	Standard SDD	25 mm² + BOOST™
REE (La–Lu)	No	**Yes**
GPS	Optional	**Standard**
Window	Standard	**Prolene**
Soil detection limits	Inferior	**1.5–2x better**

The 25 mm² detector with BOOST™ is not a marketing specification — it is a quantifiable hardware advantage. In geochemical exploration, the difference between detecting a subtle multi-element anomaly and missing it can determine the success or failure of an entire exploration campaign.

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14. Application Fit Matrix

Application	Fit	Notes
Exploration — ore deposit search	Excellent	Primary use case — pathfinder and REE detection
Contour geochemical mapping	Excellent	GPS integration enables GIS-ready datasets
REE deposit exploration	Excellent	Unique REE capability in the X-MET series
Mineral processing control	Excellent	On-site ore grade monitoring
Soil environmental monitoring (EPA 6200)	Excellent	Full RCRA metal suite at ppm levels
Contaminated site assessment	Excellent	Phase II, Brownfield, remediation
Archaeological geochemistry	Good	Slag, ore, and ancient mining site analysis
General alloy sorting	Capable	Over-specified — see Smart/Optimum for cost efficiency

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About the Author

Maksim Vedunkov — analytical equipment specialist with extensive experience in portable XRF deployment across exploration, environmental remediation, and mining process control.

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- EN: https://metal-asia.pw/en/authors/maksim-vedunkov

Specifications are based on Hitachi High-Tech Analytical Science official documentation. Parameters may vary by hardware revision. Confirm current specifications at time of order.