X-MET 8000 Optimum — Technical Datasheet and Equipment Overview

Classification: Handheld XRF Analyzer — Mid-Range PMI and Alloy Verification

Executive Summary

The X-MET 8000 Optimum occupies the strategic mid-position in the X-MET 8000 series, delivering light-element capability (Mg–U) and 6-position filter automation at a price point that undercuts fully equipped systems while addressing approximately 90% of professional PMI and production QC requirements.

Key value proposition: **Full light-element analysis, optional hot-sample capability, and professional-grade accuracy for industrial operators who require more than basic sorting but do not need trace-level CRM calibrations.**

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
Weight (without batteries)	1.3 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

The HERO™ (Heat Resistant Window) option is a critical differentiator for in-service PMI inspections where process shutdown for sample cooling is economically or operationally unfeasible. HERO™ maintains full analytical performance including light-element sensitivity at elevated sample temperatures.

2. X-Ray Tube

Parameter	Value
Anode material	Rhodium (Rh)
Max. tube voltage	40 kV or 50 kV (configurable)

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

The 50 kV configuration is recommended for the majority of PMI and scrap-control applications. The incremental cost over the 40 kV variant is marginal relative to the measurable improvement in heavy-element excitation efficiency and penetration capability.

Practical benefit of 50 kV: Improved sensitivity for K-lines of Mo, Ag, Sn, Sb and enhanced excitation of L-lines for high-Z elements (W, Pb, Bi, U). This translates to shorter measurement times or lower detection limits for critical alloying elements in superalloys and complex steels.

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3. 6-Position Filter Wheel

Technical Implementation

Automatic filter changer with six discrete filter positions. The instrument selects the optimal position based on:

- Active measurement mode (Alloy, Alloy LE, RoHS, etc.)
- Target element range for the application
- Required detection limits

Filter Position Mapping

Position	Filter Type	Optimised For
1	Open / thin	Light elements, general screening
2	Medium	Mid-range transition metals
3–5	Specialised	Specific element groups (application-dependent)
6	Heavy	High-Z elements, background suppression

Analytical Impact

The filter wheel enables the defining capability of the Optimum: **reliable determination of light elements Mg, Al, Si, P, S.** By suppressing the intense scattered radiation and matrix-element fluorescence, the filters create the signal-to-noise conditions necessary for quantification of low-energy characteristic lines.

Practical outcomes:

- Aluminium alloy series differentiation (2xxx, 5xxx, 6xxx, 7xxx) by Mg and Si content
- 303 vs 304 stainless steel separation by sulphur content
- Silicon bronze and silumin alloy identification
- Phosphorus determination in phosphorised steels

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4. Detector

Parameter	Specification
Type	Large-area Silicon Drift Detector (SDD)
Energy resolution	~130–160 eV at Mn Kα (5.9 keV)
Cooling	Thermoelectric (Peltier)
Detectable range	Mg – U (magnesium, Z=12 through uranium, Z=92)

The extension from K–U (Smart) to Mg–U (Optimum) represents a substantial expansion of analytical capability. Magnesium, aluminium, silicon, phosphorus, and sulphur — elements that are critical alloying additions or grade differentiators in major industrial alloy systems — become accessible for the first time in this price tier.

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5. Measurement Window

Standard: Transparent polymer window (Prolene or equivalent) — optimised transmission for soft X-rays from light elements.

Optional Window Shield: Metal mesh overlay for protection against sharp edges during scrap handling.

HERO™ Window: Heat-resistant Prolene-derived membrane maintaining light-element transmission at sample temperatures up to 400°C. No methodological change required — same measurement procedure, same results.

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6. Display and Interface

Parameter	Specification
Screen	4.3" Blanview sunlight-readable touchscreen
Resolution	480 x 800 px
Glove operation	Yes
Languages	13 (including EN, DE, FR, ES, IT, RU, ZH, JA, KO, PL, PT, FI)

Customisable results screen: Users configure displayed elements, Pass/Fail thresholds, and element display order to match internal quality standards.

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7. Calibration Methods

Method	Description
FP (Standardless)	Fundamental Parameters with light-element correction
Alloy	General alloy identification and quantification

Method	Description
Alloy LE	Alloy analysis with dedicated light-element optimisation
RoHS	Restricted substance screening
Geo (optional)	Geochemical screening mode
Coatings (optional)	Coating thickness measurement

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8. 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 adapters)

Dual-battery configuration ensures uninterrupted shift coverage. One battery in operation, one in reserve or charging — no workflow interruption.

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9. Data Management

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

Optional camera: 640 x 480 px, 6x magnification — sample documentation and precise positioning.

Optional small-spot collimator: 3 mm analysis spot for welds, small fasteners, and isolated features. Requires camera for visual alignment.

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10. Connectivity

- USB 2.0 (data export, PC connection)
- Bluetooth 2.0 + EDR (wireless peripherals)
- Wi-Fi 802.11 b/g (network sync, cloud)
- **ExTOPE Connect** — cloud data management, fleet oversight, remote access

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11. Radiation Safety and Compliance

- Password-protected X-ray activation

- Infrared proximity sensor — automatic shutdown
- Count-rate monitoring — emergency cutoff
- Visual warning indicators
- Fail-safe power-down mechanism
- Certifications: **CE, CB**

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12. Standard Delivery Scope

1. X-MET 8000 Optimum analyser
2. SS316 stainless steel check sample
3. Battery charger (UK / US / Euro / AU adapters)
4. Li-Ion batteries — 2 pcs.
5. USB cable
6. USB flash drive with manuals (13 languages)
7. Benchtop stand with radiation shield
8. Light radiation shield
9. Background plate
10. Holster and belt
11. Shoulder / neck strap
12. Wrist strap
13. Carry case
14. Warranty card

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13. Key Specifications Summary

Feature	X-MET 8000 Optimum
Element range	Mg – U
Filter positions	6
Hot sample capability	Up to 400°C (HERO™)
Camera	Optional
3 mm collimator	Optional
Batteries	2 (supplied)
Warranty	2 years

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14. Application Fit Matrix

Application	Fit	Notes
PMI (Positive Material Identification)	Excellent	Primary application — light elements enable grade discrimination

Application	Fit	Notes
Scrap metal sorting — premium	Excellent	Handles high-alloy and Al-series differentiation
Production QA/QC — incoming/outgoing	Excellent	Fast, accurate, WiFi/LIMS integrable
Hot sample analysis (100–400°C)	Excellent (with HERO™)	Unique capability in this price segment
Field inspection / mobile teams	Excellent	12-hour autonomy, MIL-STD durability
Aerospace alloy verification	Good	Sufficient for 90% of aerospace PMI tasks
Trace analysis (<0.01%)	Limited	Consider Expert for critical trace applications
REE / geochemical analysis	Not suitable	See Expert Geo

15. Competitive Positioning

Optimum vs. Smart

Capability	Smart	Optimum
Light elements (Mg, Al, Si, P, S)	No	Yes
Filter automation	Single fixed	6-position
Hot samples (400°C)	No	Yes (HERO™)
Camera	Optional	Optional
3 mm collimator	No	Optional
Batteries	1	2

Decision rule: If your workflow involves Al-alloy differentiation, hot-sample inspection, or any application requiring Mg/Si/P/S determination, the Optimum is the minimum viable configuration.

Optimum vs. Expert

Capability	Optimum	Expert
Tube voltage	40/50 kV	50 kV
Empirical CRM calibrations	No	Yes
Camera	Optional	Standard
Trace-level precision	Good	Best-in-series

Decision rule: The Optimum covers 90% of PMI and production QC workflows. Step up to Expert only if you require CRM-traceable empirical calibrations, the absolute best detection limits, or operate in regulatory environments where maximum analytical confidence is mandated.

About the Author

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