

X-RAY ANALYTICAL MICROSCOPE

XGT



XGT-7200V



XGT-7200V — A system for every application

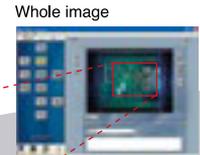
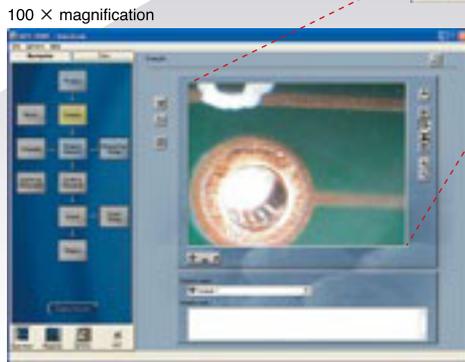
Seamless transition from optical visualization to element distribution

The XGT-7200V X-ray fluorescence (XRF) microscope combines optical visualization with high performance elemental analysis and imaging. No sample pre-treatment is necessary—simply insert the sample, and within three mouse clicks the analysis can be started. Dual Vacuum modes ensure the highest sensitivity to light elements (Full Vacuum) or atmospheric pressure analysis for fragile/biological materials (Localised Vacuum). Intuitive software guides the user through every step—from initial sample set up through to comprehensive data analysis routines.

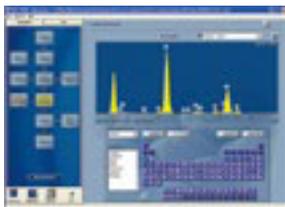


The unique HORIBA mono-capillary X-ray optics lie at the heart of the XGT systems. They provide high intensity X-ray beams with diameters ranging from 1.2 mm down to 10 μm.

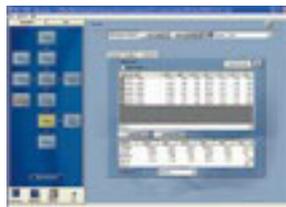
It takes just three clicks to move from sample observation to 10 μm analysis



10 μm analysis is easy - simply locate the analysis region and start the measurement.



● Acquire a spectrum to see what elements are present



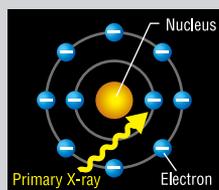
● Analyse for concentration



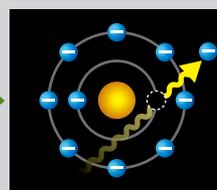
● See the element distribution

Principle of X-ray Fluorescence

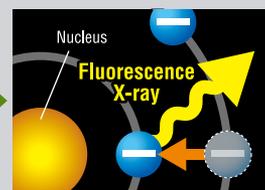
X-ray fluorescence is a non-destructive analytical technique which allows qualitative and quantitative characterisation of solids, liquids and powders. Micro-XRF combines these properties with microscopic analysis, so that individual particles and features can be analysed, and element distribution images can be generated.



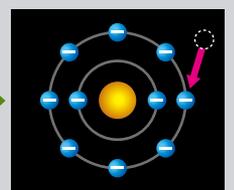
1 Absorption of primary X-ray



2 An electron is knocked out by the primary X-ray



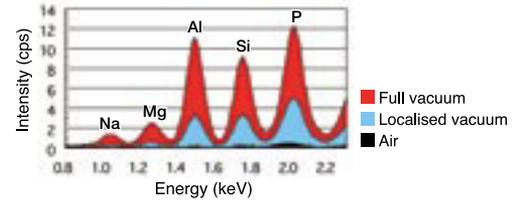
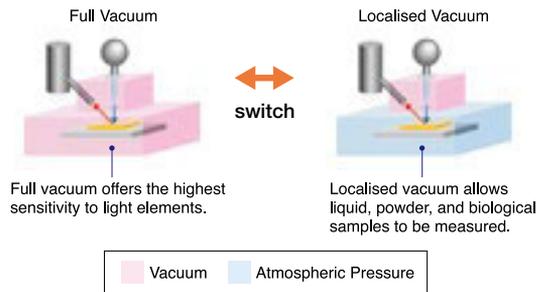
3 Unstable State → Energy is generated when an outer-shell electron falls back to the inner shell = Fluorescence X-ray



4 An external electron is taken in and the molecule is stabilized.

Chamber

The spacious sample chamber allows samples of all shapes and sizes to be accommodated. The integrated XYZ stage ensures easy handling. Within seconds the user can switch between the Dual Vacuum modes available within the sample chamber. These allow chamber conditions (and measurement results) to be optimised for different samples.



Full vacuum provides lower detection limits for light elements.

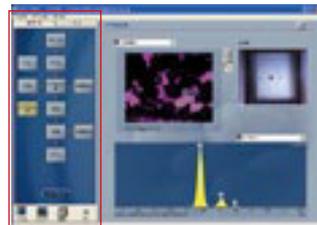
	XGT spot	
	10 μm	100 μm
Na	1.36%	0.61%
Mg	0.41%	0.18%

Sample: Silica glass

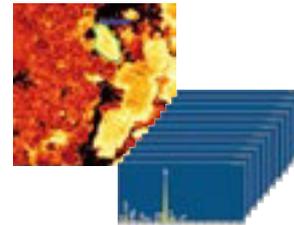
Software

The XGT-7200V is operated via intuitive software which leads the user through experiment set up, acquisition and data analysis. A full complement of acquisition modes and qualitative/quantitative analysis functions ensures the maximum versatility for the user.

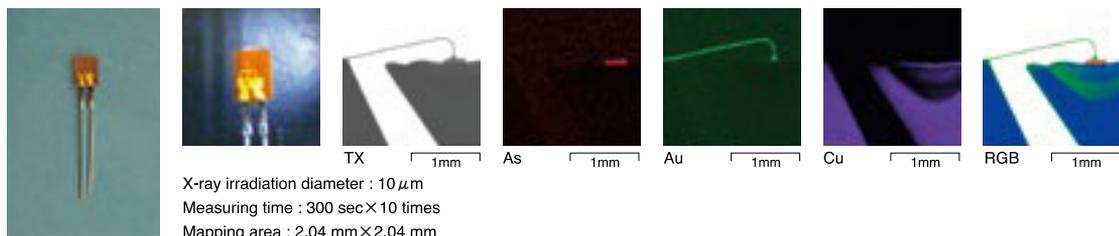
Navigator window



Smart Map



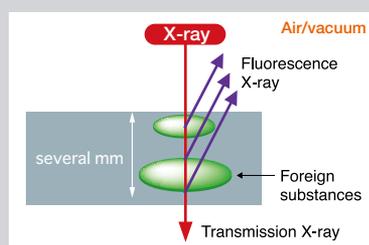
XRF and Transmission X-ray Imaging



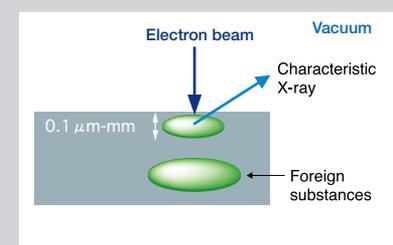
Comparison with SEM/EDX

The use of an electron beam for SEM/EDX analysis means the technique is suitable for surface analysis only. The XGT-7200V benefits from the penetrating nature of the primary X-ray beam, allowing visualization and characterisation of features not visible by eye, and higher detection limits compared with SEM/EDX since more atoms are analysed. Above all, the XGT-7200V offers increased ease of use, and is suitable for analysis of even large samples, with or without a vacuum.

XGT



SEM/EDX



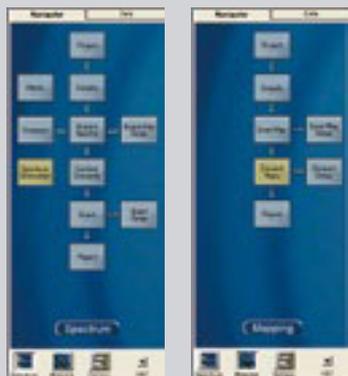
Applications



A comprehensive software platform

Easy operation

An intuitive navigator window leads the user through the experiment, from sample set up, through acquisition, to complete data analysis.



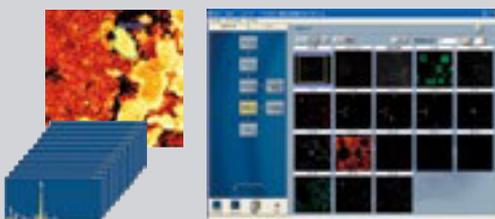
Complete acquisition options

The XGT-7200V offers the user a wide choice of acquisition methods.

- Single point analysis
- Multi-point analysis
- Automated multi-point analysis with coordinate file import
- Hyperspectral elemental imaging
- Transmission X-ray imaging

Hyperspectral imaging

A full spectrum is acquired at each and every pixel of the XRF image. Element images can be created at will after acquisition. Spectra can be generated from user defined regions within the image, allowing subsequent qualitative and quantitative analysis.



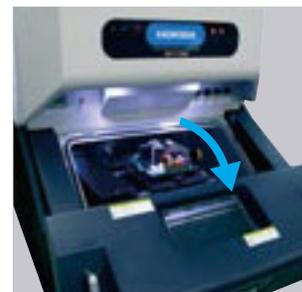
Full data analysis capabilities

With the data collected, the XGT-7200V software offers a complete data analysis package.

- Qualitative (Auto ID)
- Quantitative (Standardless, Single Standard, Calibration)
- Multi-layer thickness analysis
- Spectrum generation
- Match
- Compare and Overlay
- RGB composite image
- Report generation

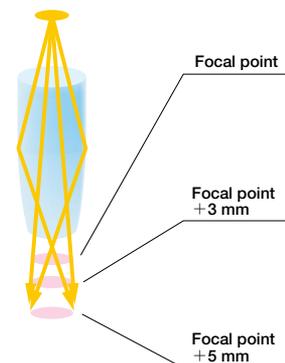


The space

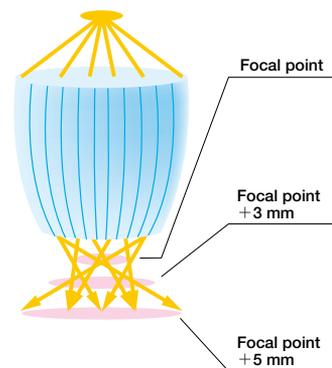


Mono-capillary

Mono-capillary



Poly-capillary



Spacious sample chamber

The spacious sample chamber allows samples of all shapes and sizes to be accommodated.

The integrated XYZ stage ensures easy handling. The user has complete control over sample movement and the analysis position via three integrated colour video cameras.

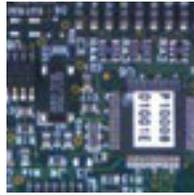
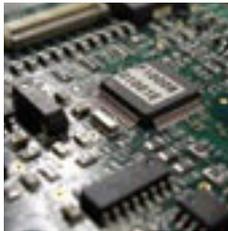


Capillary

The HORIBA X-ray Guide Tube (XGT) provides X-ray beams with high intensity and microscopic diameters - ranging from 1.2 mm down to a unique 10 μm . They allow fast and easy elemental analysis of individual particles and features.

The exclusive use of mono-capillary optics in the XGT-7200V ensures analytical clarity with parallel beams which are optimised for micro-XRF analysis. These allow "focus free" analysis - even with rough samples precise, well-defined elemental images can be obtained. Acquisition times are kept to a minimum because time consuming "autofocus" procedures are not required.

Application Rough or unevenly shaped sample



Mapping area



Ni



Sn

X-ray irradiation diameter : 100 μm
 Measuring time : 300 sec \times 15 times
 Mapping area : 2.80 mm \times 2.80 mm
 X-ray tube voltage : 50 kV

Application Copper mesh



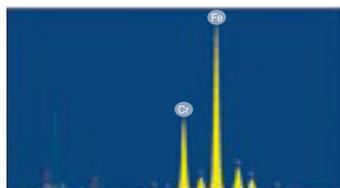
Mapping area



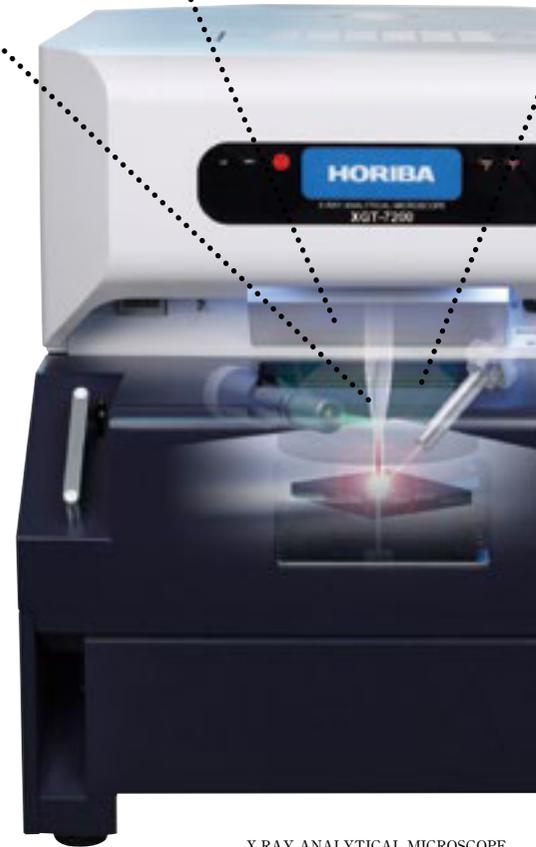
Cu

Voltage : 50 kV
 Current : 1 mA
 Mapping area : 0.512 mm \times 0.512 mm
 Measuring time : 2000 sec \times 14 times
 Line pitch : 7 μm
 Hole pitch : 30 μm
 XGT diameter : 10 μm

Application Engine wear



X-ray irradiation diameter : 100 μm
 X-ray tube current : 1 mA
 Measuring time : 300 sec
 X-ray tube voltage : 50 kV



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XGT

7200V

Dual vacuum chamber

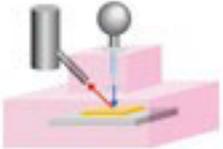


The Dual Vacuum modes of the XGT-7200V offer the user versatility for a wide range of samples. Even samples which cannot withstand full vacuum conditions can be analysed by using the Localised Vacuum mode, which retains the sample at atmospheric pressure.

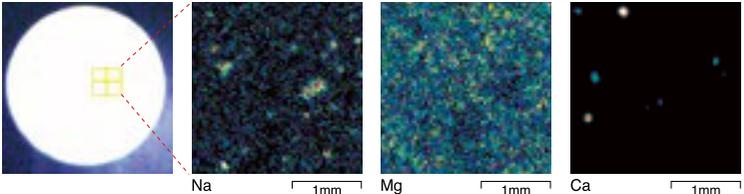
Application Tablet

The Full Vacuum mode offers the highest sensitivity to light elements. It provides optimised analysis conditions for pharmaceutical tablets, mineral sections and light element alloys.

Full Vacuum




X-ray irradiation diameter : 100 μ m
 Measuring time : 1000 sec \times 100 times
 Mapping area : 2.5 mm \times 2.5 mm
 X-ray tube voltage : 15 kV



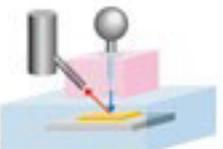
Na 1mm Mg 1mm Ca 1mm

Fast switching

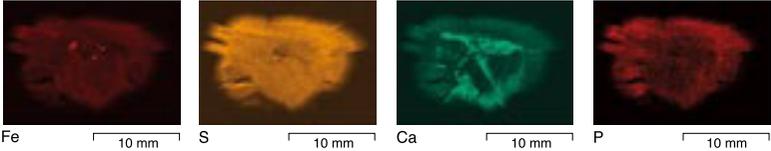
Application Clam

With the Localised Vacuum mode it is possible to analyse biological materials and other samples which cannot be subjected to a full vacuum. The XRF images below are from a clam - they show the general internal structure of the organism, together with ingested iron sand particles.

Localised Vacuum




X-ray irradiation diameter : 100 μ m
 Measuring time : 300 sec \times 30 times
 Mapping area : 20 mm \times 16 mm
 X-ray tube voltage : 50 kV
 X-ray tube current : 1 mA

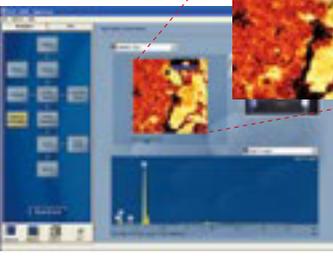


Fe 10 mm S 10 mm Ca 10 mm P 10 mm

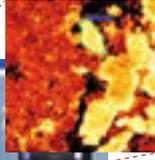
SmartMap



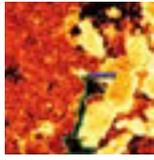
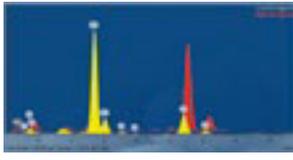
The XGT-7200V's SmartMap software gives unlimited analysis flexibility and it acquires spatial and spectral information. After the acquisition the user can generate element images at will, or extract spectra from specified regions within the map. Thus it is possible to both examine element distribution and perform qualitative/quantitative spectral analysis from a single dataset.



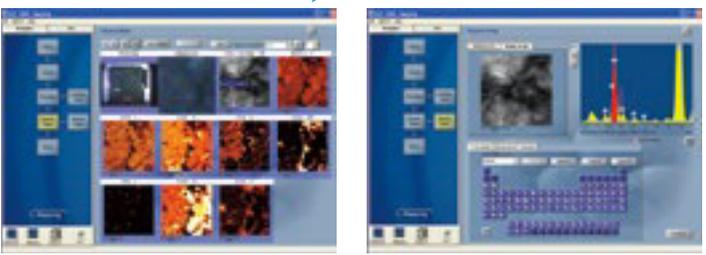
Generate a spectrum from a user defined region within the element image.




Spectra from different regions can be compared in order to identify their differences in elemental composition

Elemental images can be generated during acquisition, or at any time afterwards. Simply select the element and view its distribution image.



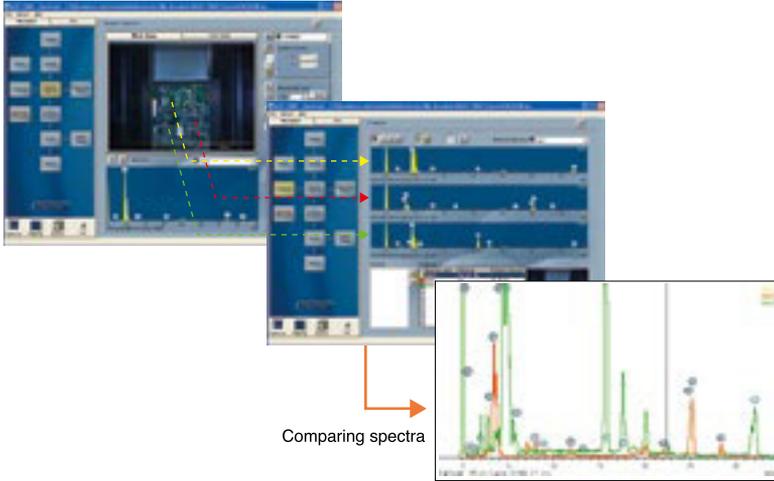
Multi-point analysis



The software controlled sample stage allows the user to define a number of experiments, including multi-point, line, and grid analyses.

Application PCB board

A maximum of 1000 points can be specified for multi-point analysis. Once the points are defined on the whole sample image and/or the high magnification image the spectra are automatically collected.

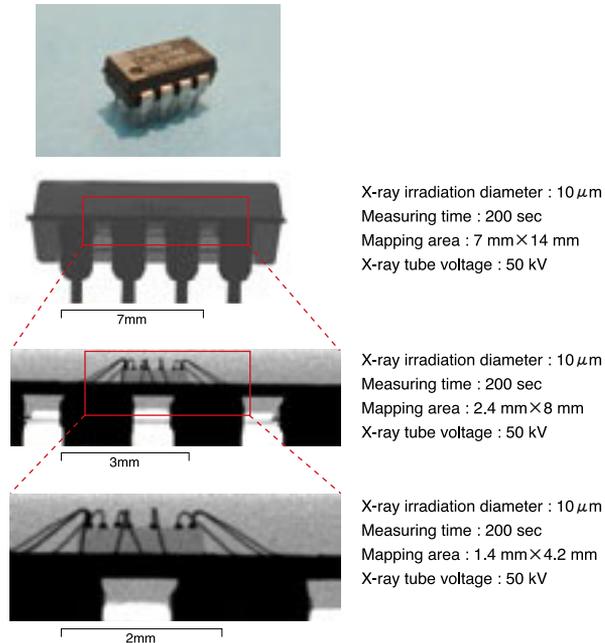


X-ray transmission image



With the XGT-7200V the penetrating nature of X-rays can be harnessed to view the internal structure of a sample - without having to open it up. The collimated beams generated by the X-ray guide tube allows unevenly shaped samples to be imaged with high resolution.

Application IC chip



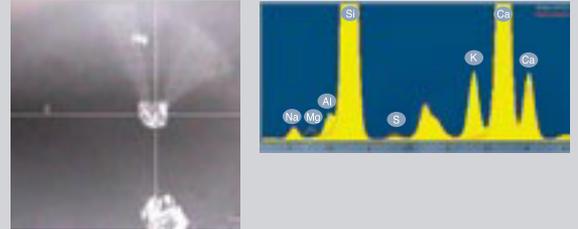
Application Focus

FORENSIC SCIENCE

Forensic scientists generally require fast and non-destructive analysis of a very wide range of materials. Often these materials are presented in very small quantity, as evidence collected from a crime scene. The elemental "fingerprint" which XRF reveals is used to identify unknown materials, match crime scene materials to those found on suspects and provide vital information on explosive/gunpowder constituents. Furthermore, XRF mapping allows gun shot residue patterns to be observed, and paint cross sections to be characterised.

Application Glass

Microscopic glass fragments are often found at crime scenes and on the clothing of criminal suspects. By analysing the glass it is possible to gain valuable evidence linking a suspect to a specific crime scene. The images show a 100 μ m particle viewed with the XGT-7200V's optical microscope, and spectra from two particles which illustrate clear compositional differences.

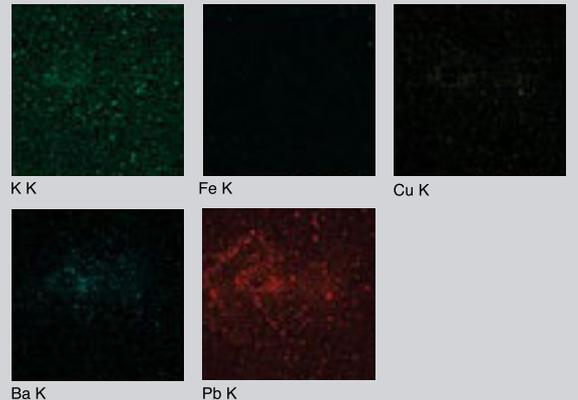


Application GSR (Gun Shot Residue)

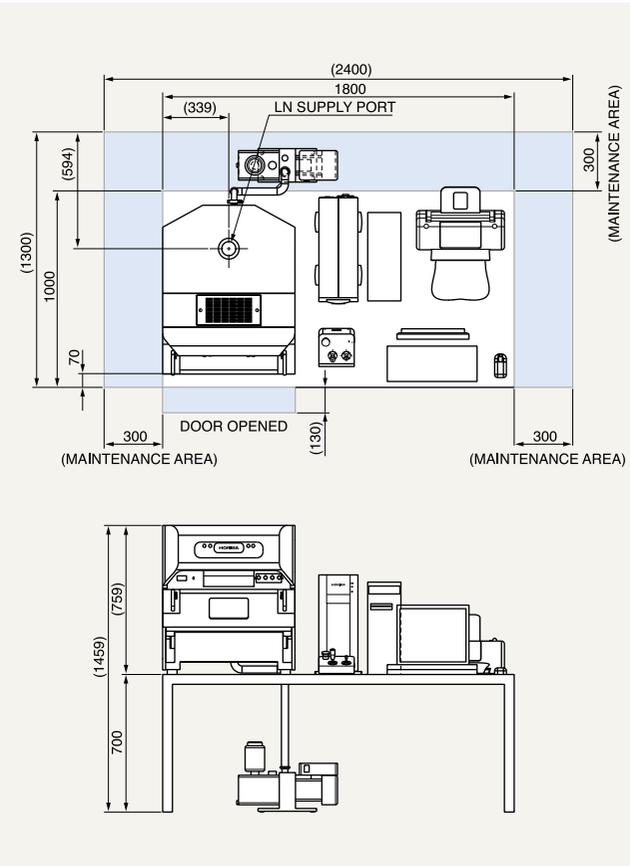
GSR is a mixture of explosives, propellants and metal fragments expelled from the gun barrel during firing. Analysis of GSR composition and patterning provides information on the gun and bullets, and the proximity of the weapon when fired. Matching GSR materials on a victim and suspect can be used to assist prosecution.



White light image



■Outer dimension Unit: mm



■Specification of XGT-7200V

Basic	Principle	Energy dispersive X-ray fluorescence spectrometry
	Detection range	Sodium (¹¹ Na) to Uranium (⁹² U)
	Sample type	Solid, Liquid, Powder
Detector	Fluorescence X-ray detector	SDD (LN ₂ Free)
	Transmission X-ray detector	NaI(Tl) scintillator
X-ray generator	X-ray tube	Rh target Tube voltage: 15/30/50 kV Tube current: Max 1.0 mA
	X-ray guide tube	Dual-tube combination Standard: 10 μm + 100 μm, 1.2 mm + 10 μm, 1.2 mm + 100 μm Option: Primary filter wheel for 1.2 mm
Sample chamber	Sample chamber size	450(W) × 500(D) × 80(H) mm
	Atmosphere	Dual vacuum modes: Full vacuum, Localized vacuum (sample at atmospheric pressure) and air
	Sample size	340(W) × 250(D) × 80(H) mm, 1 kg or less
	Sample stage	Motorized XYZ
Analysis	Optical image	Whole sample image: ×2 magnification Detail image: ×100 magnification Sample height image: ×2 magnification
	Data acquisition	Single/Multi point analysis, Line analysis, Grid analysis
	Qualitative analysis	Peak Auto ID, KLM marker, Peak search, Spectrum matching, Automatic qualitative function
	Quantitative analysis	FPM (No standard needed), FPM with single standard calibration, Calibration curve, Multi-layer thickness FPM (Optional)
Utility	Mapping	XY mapping area; Max 100 mm × 100 mm
	Date management	Data export to Excel (Option)
	Power supply	AC120 V, 220 V, 240 V ± 10%, 50/60 Hz
	Power consumption	Below 1.8 kVA
Dimension	Operation	PC (Windows 7)
	Instrument weight	Approx. 200kg (Main unit)
	Outer dimensions	Main unit: 700(W) × 900(D) × 800(H) mm



The HORIBA Group adopts IMS (Integrated Management System) which integrates Quality Management System ISO9001, Environmental Management System ISO14001, and Occupational Health and Safety Management System OHSAS18001. We have now integrated Business Continuity Management System ISO22301 in order to provide our products and services in a stable manner, even in emergencies.



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