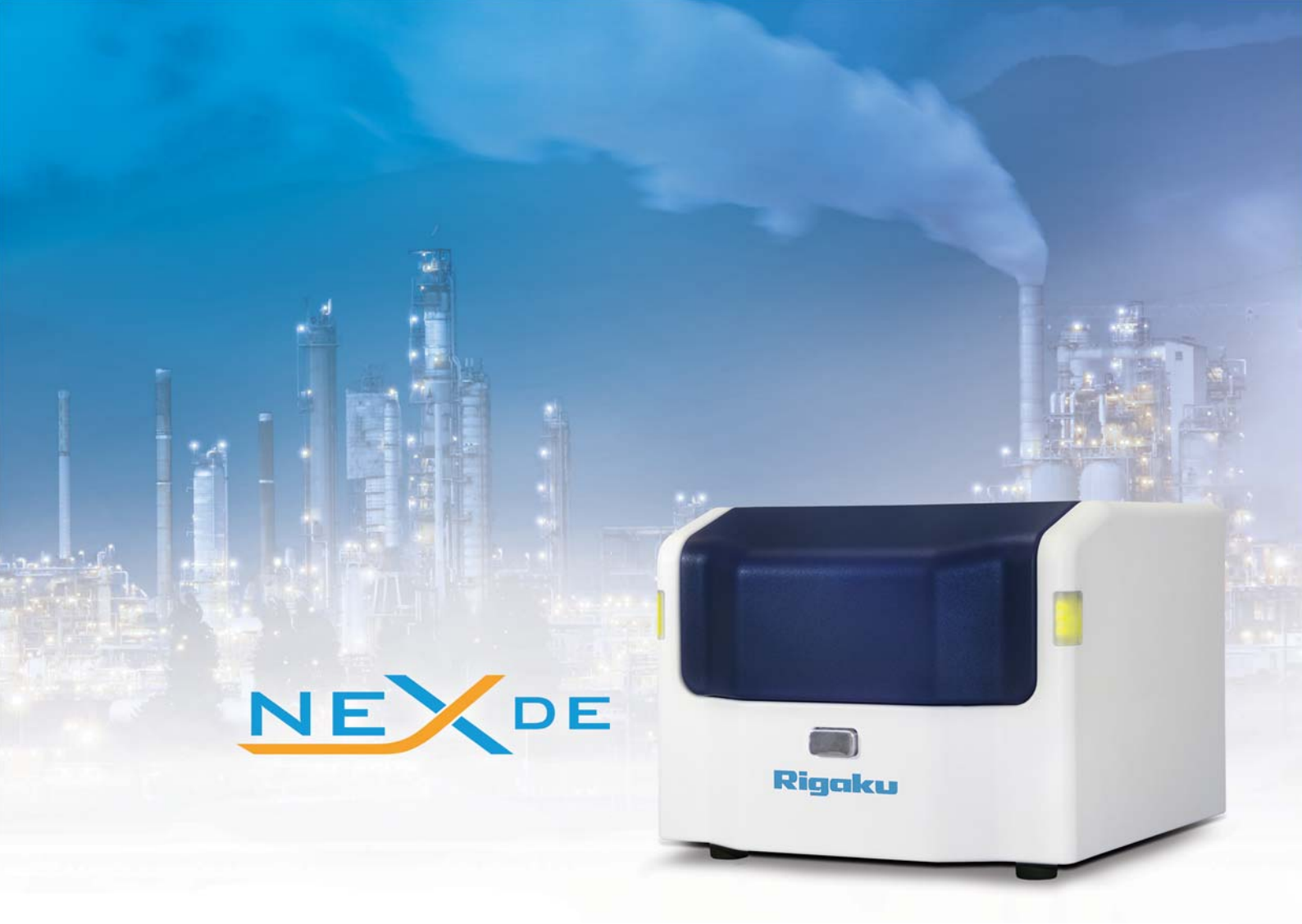
NEXDE

Elemental Analysis by X-ray Fluorescence

High-Performance, Direct Excitation EDXRF Elemental Analyzer

Rigaku

Applied Rigaku Technologies



Cost-effective Performance in a Compact Package

Energy dispersive X-ray fluorescence (EDXRF) is a routinely used analytical technique for the qualitative and quantitative determination of major and minor atomic elements in a wide variety of sample types. The heart of its versatility stems from the ability to provide rapid, non-destructive, multi-element analyses — from low parts-per-million (ppm) levels to high weight percent (wt%) concentrations. NEX DE, a versatile Rigaku EDXRF spectrometer, delivers non-destructive analysis of sodium (Na) to uranium (U) across a diverse range of matrices — from homogeneous liquids of any viscosity to solids, thin films, alloys, slurries, powders, and pastes.

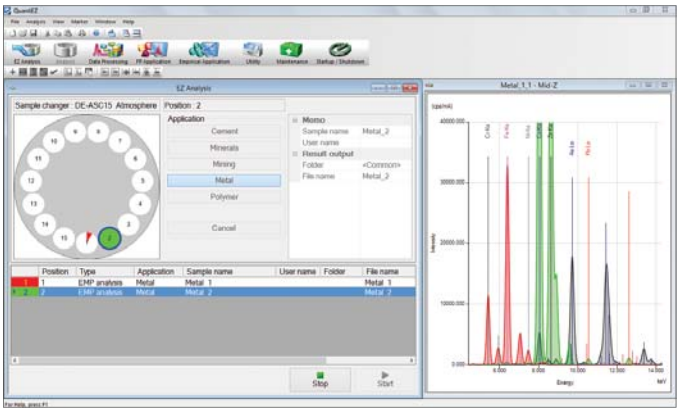
Elemental Analysis in the Field, Plant, or Lab

NEX DE is designed and engineered for heavy industrial use. Whether on the plant floor or in remote field environments, the superior analytical power, flexibility, and ease of use of the NEX DE add to its broad appeal for an ever-expanding range of applications, including exploration, research, pharmaceuticals, bulk RoHS inspection, education, and industrial and production monitoring applications. NEX DE is well-suited for basic quality control (QC) or its more sophisticated variants, such as analytical quality control (AQC), quality assurance (QA), or statistical process control like Six Sigma. With multi-element capabilities and low limits of detection, NEX DE is a reliable, cost-effective choice for routine elemental analysis.

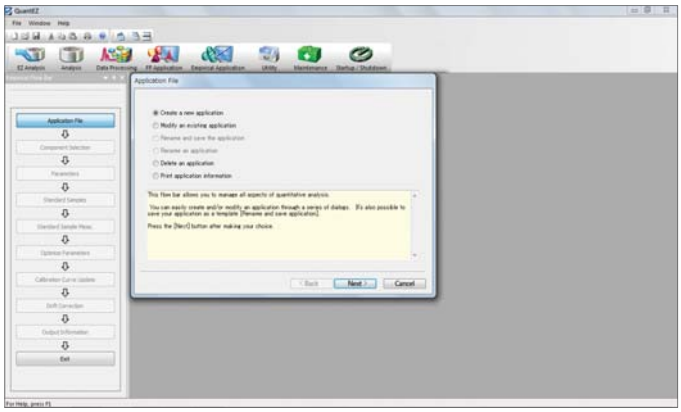
Maximize Time and Productivity with Intuitive Instrument Control

Powerful, User-friendly QuantEZ® Software

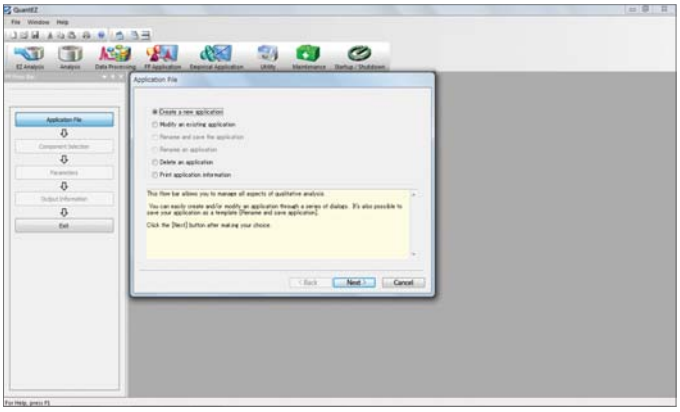
NEX DE features QuantEZ® analytical software designed explicitly for Rigaku EDXRF benchtop analyzers. It provides intuitive instrument control, simple menu navigation, and a customizable EZ Analysis interface. Running under the Microsoft® Windows® operating system, on either a desktop or notebook computer, the software offers all the functions required for calibration and routine operation. Rigaku has developed software that is not only user-friendly but sophisticated and powerful enough for the most complex analysis. Based on decades of XRF software development at Rigaku, the easy-to-use flow bar wizard walks users through the steps required to set up either an empirical or fundamental parameters application.



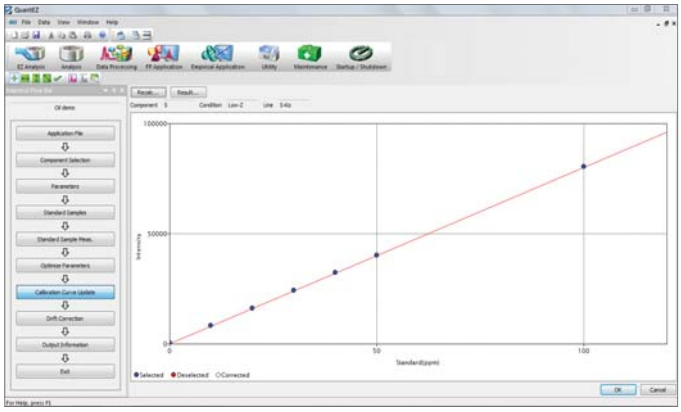
EZ Analysis interface, available in various languages, is used for routine measurements. A live spectral display is shown in the window on the right.



The flow bar wizard is shown on the left side of the screen for empirical calibration.

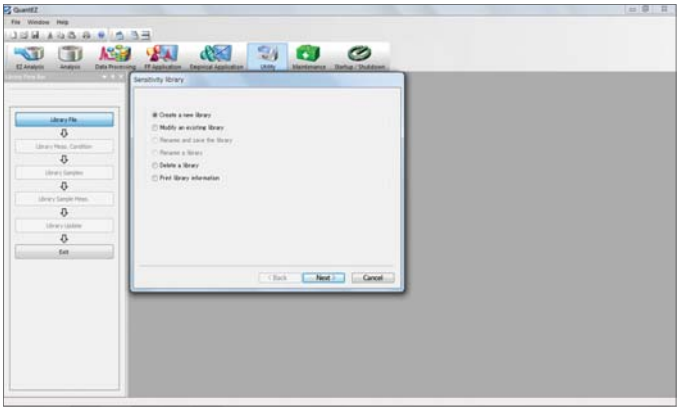


The flow bar wizard is shown on the left side of the screen for the optional Fundamental Parameters module.



An Illustration of an empirical calibration curve is shown, one of the flow bar steps to set up an application.

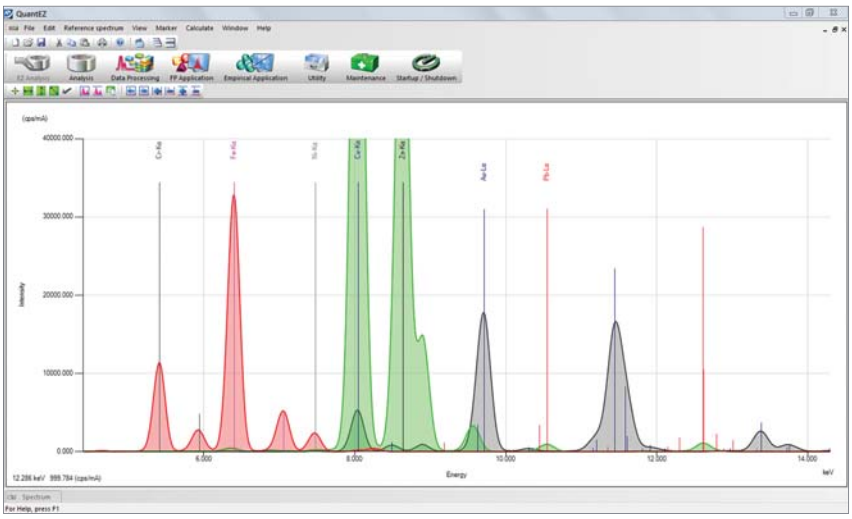
Easy to use Component Selection screen within the optional Fundamental Parameters module.



The flow bar wizard is shown on the left side of the screen for the setup of a Matching Library within the optional Fundamental Parameters module.

Exceptional Spectral Resolution and Throughput

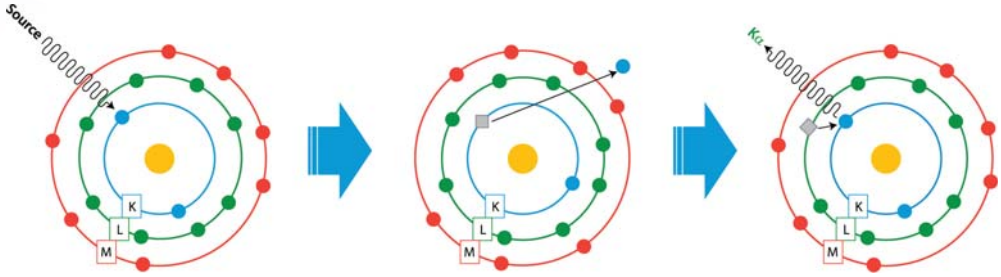
For demanding applications or for situations where analysis time or sample throughput is critical, NEX DE delivers high-performance EDXRF. It is equipped with a 60 kV, 12 W X-ray tube, single and multilayer tube filters, and a high-throughput silicon drift detector (SDD) that supports count rates over 500K cps. The high-count rates deliver low limits of detection and provide excellent spectral resolution. These features enable the NEX DE to deliver the highest precision analytical results in the shortest possible measurement times. Combined with powerful QuantEZ® software, NEX DE offers users unparalleled performance.



QuantEZ® software, coupled with the high-resolution SDD, provides an easy-to-use qualitative evaluation of spectra. Shown are overlapped spectra with element line markers.

How it Works

EDXRF is a primary type of X-ray fluorescence (XRF). In XRF, an electron can be ejected from its atomic orbital by the absorption of X-rays (photons) from an X-ray tube. When an inner orbital electron is ejected (illustration in the middle), a higher energy electron transfers to fill the vacancy. During this transition, a characteristic photon may be emitted (illustration on the right) with a unique energy for each type of atom. The number of characteristic photons per unit time (counts per second or cps) is proportional to the amount of that element in a sample. Thus, qualitative and quantitative elemental analysis is achieved by determining the energy of X-ray peaks in a sample spectrum and measuring their associated count rates.

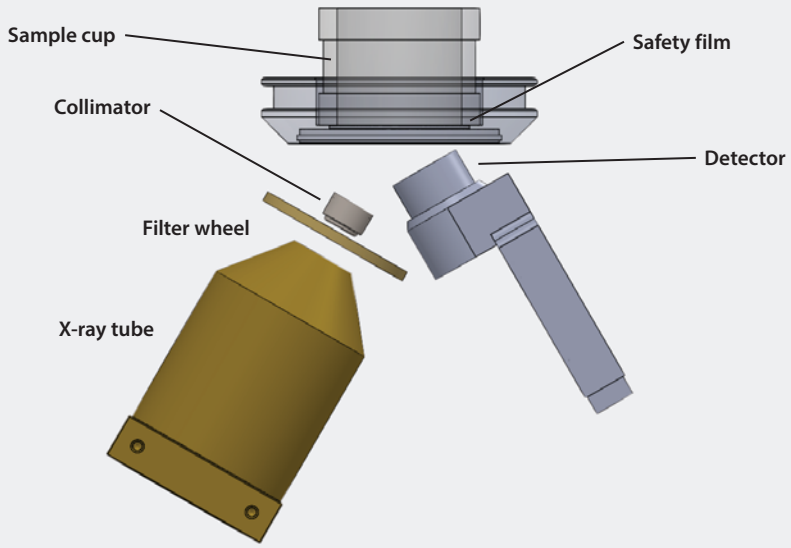


X-ray fluorescence schematic

High-performance Direct Excitation EDXRF

NEX DE is a high-performance direct excitation EDXRF system. The 60 kV X-ray tube and Peltier-cooled semiconductor detector technology delivers exceptional short-term repeatability and long-term reproducibility with excellent elemental peak resolution. The high voltage with multiple automated tube filters provides multi-element analysis capability for unmatched performance with low limits of detection.

The optical kernel is protected by a safety film that can be changed without tools, and the X-ray tube only operates during data collection, lowering operating costs. The instrument's large sample chamber accommodates samples up to 30 cm in diameter and 10 cm tall, as well as a variety of single position and interchangeable automatic sample changer options.



Nondestructively Analyze Sodium through Uranium in Almost Any Matrix

✓ High-throughput SDD

The silicon drift detector (SDD) affords an extremely high-count rate capability with excellent spectral resolution.

✓ Powered by 60 kV, 12 W X-ray Tube

The close-coupled end-window Ag-anode X-ray tube delivers superior light element performance.

✓ X-ray Tube Conservation

By operating only during data collection, X-ray tube wear and tear is minimized, lowering operating costs.

✓ Leak Protection

No tools are required to change the safety film protecting the optical kernel, enabling easy and rapid clean-up and replacement.

✓ QuantEZ® for Simple Routine Operation

QuantEZ®, a powerful PC-based software, provides intuitive instrument control with simple menu navigation and a customizable EZ Analysis interface. Maximize time and productivity with simplified routine operations and create new applications using a simple flow bar wizard.

✓ Advanced Fundamental Parameters Software

RPF-SQX, featuring Rigaku Profile Fitting technology and Scattering FP, allows semi-quantitative analysis of almost all sample types without standards — and rigorous quantitative analysis with standards.

✓ User-definable Matching Libraries

Calibration standards can be expensive and difficult to obtain for many applications. With RPF-SQX Matching Libraries, the number of required standards is greatly reduced, significantly lowering the cost of ownership and reducing workload requirements for running routine analyses.

✓ Digital Data Output

Export as PDF or CSV and store copies to USB or output to LIMS.

✓ Measure Large Samples

The large sample chamber accommodates samples up to 30 cm in diameter and 10 cm tall, as well as a variety of single position and autosampler options.

✓ Automated Sample Handling

Obtain high-throughput measurements with various interchangeable automatic sample changer options, accommodating 32, 40, and 50 mm cups.

✓ Analysis Under Vacuum

An optional vacuum system comes with a high-capacity pump and vacuum sensor, delivering superior light element sensitivity for non-volatile samples and short pump-down times.

Large object configuration

Applications Span Global Industries

Catalysts

EDXRF analysis of heterogeneous and homogeneous catalysts can determine heavy metal content or stoichiometry and quantify poisoning agents. Determination of the value of precious metals content in recycled automotive catalysts is a cost-effective application for the NEX DE.

Cement

NEX DE is a reliable, rugged, affordable system for quality control measurements at cement plants. It is an ideal tool throughout production and as a backup for WDXRF systems. NEX DE is applicable to clinker and raw meal and may be used to measure gypsum (SO3) in finished cement.

Coatings

Controlling coating thickness or composition is vital for the release, metal finishing, and automotive industries. EDXRF has long been a standard technology for release coatings, converters, vacuum-formed plastics manufacturers, and other sectors using silicone oils as barrier layers, release coatings, or denesting agents. Metallic coatings, either electroplated or sputtered onto a substrate material, may also be quantified with the NEX DE.

Cosmetics

Since many additives in cosmetics are minerals or inorganic compounds, EDXRF is ideal. Applications include Ti and Zn oxides as UV blockers, Fe, Ti, and Zn oxides, and metallic dyes as pigments. NEX DE can also screen cosmetics for toxic metals and inspect incoming raw materials.

Education

Understanding the basics of atomic spectroscopy is one of the key tenets underpinning the core sciences of physics and chemistry. The affordable NEX DE is an ideal way to give students instrumentation time in the lab to support their classroom instruction. Unlike AA or ICP, no routine maintenance or consumables are required.

Geology

In studying Earth, geologists routinely analyze the composition of rock and mineral samples. Rapid elemental analyses can be accomplished with NEX DE without sample digestion. Typical industrial geological applications include the analysis of limestone, kaolin clay, and silica sand.

Metals and Alloys

Elemental analysis is typically used as a basis for classifying alloys, controlling their production, or verifying their designation. In addition to routine QC applications like iron aluminum alloys, NEX DE may also be used for analyzing slags, feeds, and tailings in the smelting process.

Mining and Refining

Foundries, smelters, and mills are characterized by having continuous production, demanding control of both the process and the quality of incoming and outgoing materials. NEX DE may be used to analyze ores, feeds, slags, and tails and makes an ideal, affordable backup analyzer.

Paint and Pigments

Many paints and pigments contain metal dyes, opacifiers, and other inorganic stabilizers that EDXRF can analyze. One specific application is titanium dioxide and lead chromate in white and yellow road paint. NEX DE is also an ideal low-cost solution for industrial quality control and forensic identification of paint chips.

Petroleum

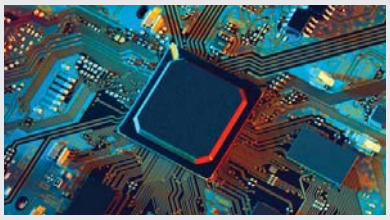
From the quantification of heavy elements in crude oil to sulfur in fuels to a variety of elements in lubricating oils, EDXRF is a well-established technique for the petroleum and petrochemical industries. For sulfur in crude oil, bunker fuel, and ULSD, NEX DE helps ensure compliance with ASTM D4294, ISO 20847 and 8754, IP 496 and 336, JIS K 2541-4, as well as ISO 13032.

Pharmaceuticals

Palladium (Pd) is a common catalyst in pharmaceutical manufacturing. NEX DE is ideal for measuring Pd catalysts in pharmaceuticals and monitoring for trace heavy metals such as unwanted cadmium (Cd), lead (Pb), mercury (Hg), and other elements of interest in pharmaceutical products.

Plastics

Plastics, polymers, and rubber are combined with different additives to afford specific properties. Commonly analyzed as beads, pressed or molded into plaques, typical applications include Br and Sb as fire retardants; stabilizers and lubricants such as P, Ca, Ba, and Zn, as well as Mg, Al, Si, Fe in fiberglass and S in polyurethane.



RoHS/WEEE

Restriction of Hazardous Substances (RoHS) directives require producers to recycle waste electrical/electronic equipment and remove certain heavy metal toxins, including Pb, Cd, Hg, and hexavalent chromium (Cr). NEX DE can help compliance by providing rapid elemental analysis of bulk materials.

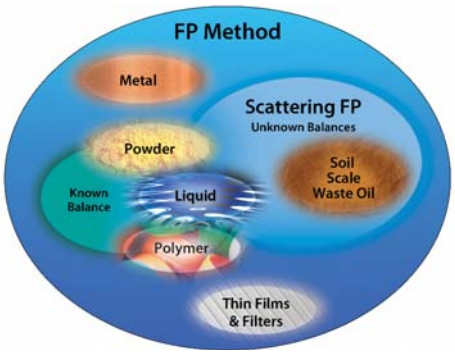
Wovens and Non-wovens

Fabrics of all kinds are created with inorganic chemical additives or treated with compounds to modify the material's behavior. NEX DE is ideal for quantifying compounds such as fire retardants, UV stabilizers, anti-microbial treatments, and electromagnetic shielding.

Options

Advanced Fundamental Parameters Software

Advanced qualitative and quantitative analysis is powered by Rigaku's RPF-SQX Fundamental Parameters (FP) software, featuring Rigaku Profile Fitting (RPF) technology and Scattering FP. This robust integrated software allows semi-quantitative analysis of almost all sample types without standards — and rigorous quantitative analysis with standards. Rigaku's Scattering FP method automatically estimates the concentration of unmeasurable low atomic number elements (hydrogen to fluorine) and provides appropriate corrections.



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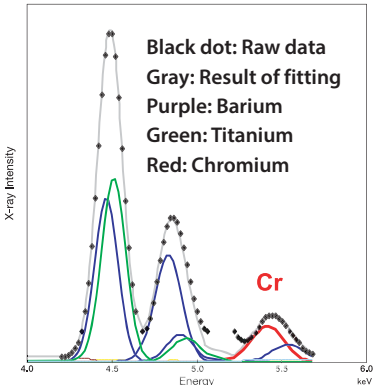


For RoHS polymer standard BCR680, coexisting elements Ti and Ba overlap with Cr; RPF-SQX deconvolutes the overlap so that Cr can be analyzed.

Autosampler and Sampling Options

In addition to the standard single-position (32 mm) sample holder and large object configuration, three optional automatic sample changers are offered. A 15-position changer accommodates 32 mm samples, the 10-position variation accepts 40 mm samples, and the 9-position takes 50 mm samples. All autosampler trays accept industry-standard sample cups, and extra trays may be used to preload trays for batch analysis.

Sample Spinner

Coarse-grained, inhomogeneous, and rough finished samples should be rotated during analysis to provide an averaged presentation and suppress diffraction peaks. Thus, a single position 32 mm sample spinner is offered as an option. Extremely robust in design, the spinner is almost entirely silent while rotating at its nominal speed of 30 rpm. It may be used in autosampler-equipped models by replacing the automatic sample tray.

Optional sample spinner

Vacuum Atmosphere

For non-volatile samples, a vacuum atmosphere maximizes light element sensitivity. The optional single sample vacuum system is easily attached, inside the measurement chamber, without using tools. Included is a high pumping speed, compact, and quiet rotary vacuum pump capable of obtaining a <50 Pa pressure in the sample vacuum system.

Helium Purge

Light element performance is dramatically improved by using a helium (He) environment during analysis.

Optional vacuum system

Specifications

General

Energy dispersive X-ray fluorescence (EDXRF)
Analytical range Na to U
PPM to % levels
He purge option required for light element performance

Excitation

X-ray tube with Ag anode
60 kV max voltage, 1 mA max current
12 W max power
Automated 7-position primary filter wheel

Detection

High-performance silicon drift detector (SDD)
+500K cps throughput
Peltier electronic cooling
Digital pulse processor
Automated or user configurable shaping times for optimum analytical performance

Sample chamber

Large 30.5 (W) x 30.5 (D) x 10.5 (H) cm sample chamber allows for various sample sizes
Single-position 32 mm sample aperture with leak protection
17.5 mm ID flat sample ring for large samples

Environmental conditions

Ambient temperature 18 – 28°C (65 – 82°F)
Relative humidity ≤75% non-condensing
Vibration undetectable by human
Free from corrosive gas, dust and particles

Software

QuantEZ® software for control of spectrometer functions and data analysis
Simple flow bar wizard to create new applications
Empirical calibration with overlap and matrix compensation
Data export to USB or Ethernet
Multi-language (English, Chinese, French, Japanese, Portuguese, Italian, Spanish, German, and Russian)

Backed by Rigaku

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. With hundreds of major innovations to their credit, the Rigaku group of companies are world leaders in the field of analytical X-ray instrumentation. Rigaku employs over 1,500 people worldwide in operations based in Japan, the U.S., Europe, South America, and China.

Warranty

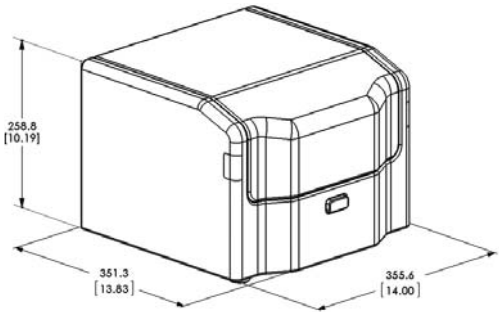
Our Guarantee
Applied Rigaku Technologies offers a 2-year warranty on all EDXRF spectrometers it produces. This industry-leading manufacturer's warranty shows our commitment to quality and displays our dedication to maximizing uptime for our customer's processes and applications.

Options

Single-position 40 mm sample aperture	
Single-position 32 mm sample spinner	
Single-position 47 or 51.5 mm large area offset spinner	
15-position automatic sample changer (32 mm samples)	
10-position automatic sample changer (35 – 40 mm samples)	
9-position automatic sample changer (50 mm samples)	
Single-position 32 or 40 mm sample vacuum system (including pump), pressure <50 Pa	
Helium purge	Flow rate 0.2 L/min (during analysis only) Helium purity 99.95% Tubing 6 mm OD x 4 mm ID, 10 meters
RPF-SQX Fundamental Parameters software	Qualitative and quantitative analysis Rigaku Profile Fitting Bulk and thin film models Application Templates (Metals, oxide powders, polymer including pellet or solid/powder, and water, oil, and liquids) User-configurable Matching Libraries
Material ID software	
IQ/OQ instrument validation	
SureDI support for 21 CFR Part 11 compliance	
LIMS	
Uninterruptible power supply (UPS)	
Computer	External PC, desktop or notebook Microsoft® Windows® operating system Keyboard, mouse, and LCD monitor (desktop)

Spectrometer data

Single phase AC	100 – 240 V, 1.5 A (50/60 Hz)
Dimensions	35.6 (W) x 35.1 (D) x 26 (H) cm (14 x 13.8 x 10.2 in)
Weight	<27 kg (<60 lbs)



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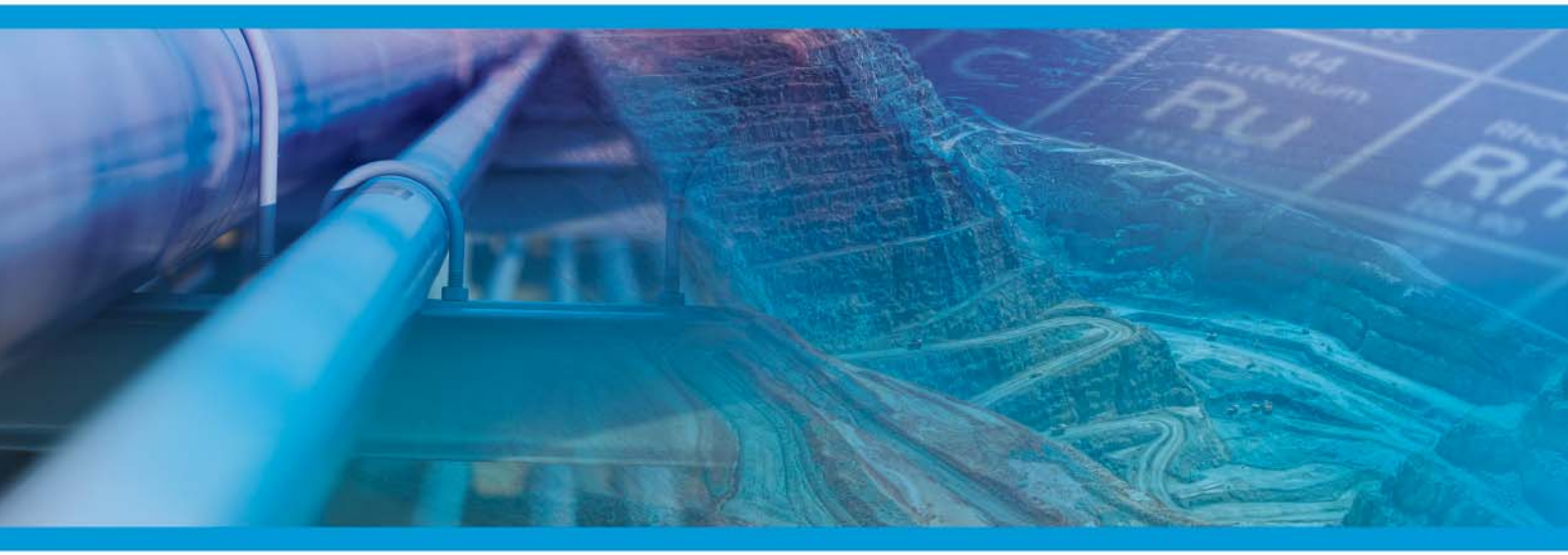

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