ZSX Primus III NEXT

HIGH-END INDUSTRIAL WDXRF
FOR THE ANALYSIS OF SOLID SAMPLES

Rigaku
POWERING NEW PERSPECTIVES
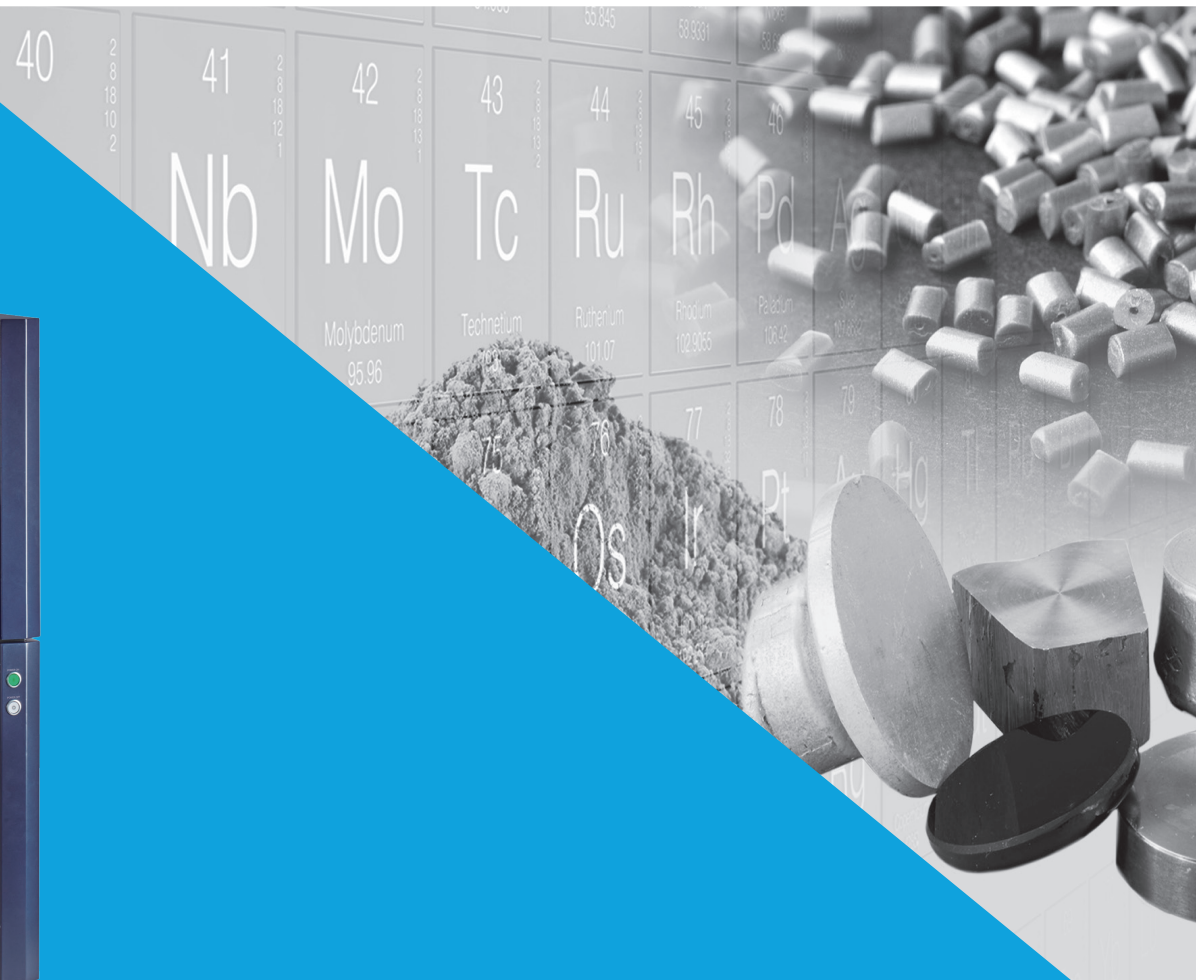
Wavelength Dispersive X-ray Fluorescence Spectrometer

OVERVIEW OF THE MAIN FEATURES AND BENEFITS

- **High-end WDXRF spectrometer for industrial environments** - *State-of-the-art industrial spectrometer for more harsh operating conditions*

- **Increased reliability due to tube-above configuration** - *Less risk of spectrometer contamination, thereby increasing uptime*

- **Extended analytical flexibility -** *Full elemental analysis ($_4$Be to $_{96}$Cm)*

- **ZSX Guidance software** - *No need to be a specialist. Integrated intelligence assists with calibration development*

- **High-speed analysis** - *Precise and accurate results in minutes allows real-time process control*

- **Attractive pricing** - *All this for a more than affordable price*

- **Improved service and application support** - *Rigaku is a trusted partner*

- **Data sharing** - *Makes it possible to have the Rigaku spectrometers in all your laboratories operating on the same calibrations*
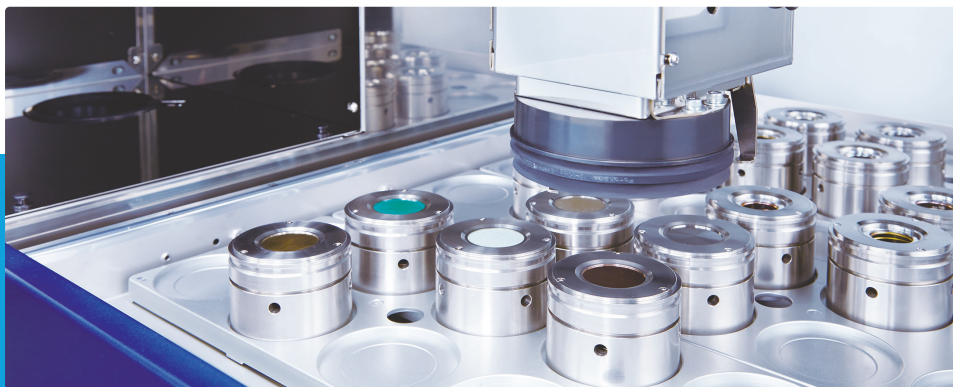
MAIN MARKETS AND PRE-CALIBRATION PACKAGES

The main use of WDXRF is to analyze the composition of samples that are either raw materials, intermediates or end products. There are certain industrial markets that are key users of XRF technology. The ZSX Primus III NEXT is ideal for the following applications:

Minerals and Mining: The many types are mostly primary materials for other industries. Depending on the purpose, the analysis of major and minor oxides as well as trace elements may be of importance. To meet the needs of such applications, the dedicated pre-calibrated methods OXIDE-FB-PAK and GEO-TRACE-PAK have been developed.

Cement: This industry needs continuous control of the raw materials, raw mix, clinker, and cement samples. High sample throughput and fast analysis times are very often a must. The OXIDE-FB-PAK will avoid the need to develop many different calibrations for each type of sample.

Steels and Metals: Many different metals and alloys are produced for a wide variety of applications. We offer application packages for the main groups of metals: low alloy steel, stainless steel, FeNiCo-based alloys and ferroalloys.

Petrochemicals/Polymers: It's impossible to imagine a world without plastics. WDXRF can be used to determine the concentration of additives and impurities in the many types of polymers.

Chemicals: Hundreds of chemicals, often derived from minerals, are produced daily and are subject to quality control. WDXRF is a primary technique used to assure the quality of these products. Rigaku can help you find an appropriate set of calibration standards.


OXIDE-FB-PAK
Pre-Calibration Package

GEO-TRACE-PAK
Pre-Calibration Package

HARDWARE FEATURES AND BENEFITS

TUBE-ABOVE OPTICS

With high-precision analytical instruments, there is always the worry that the spectrometer could be damaged by an inexperienced operator.

This is not the case with the ZSX Primus III NEXT.

Due to its tube-above optics, the instrument is safe even if a pressed pellet breaks inside the spectrometer.
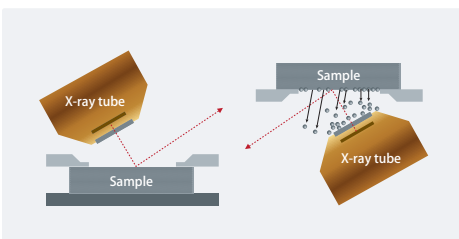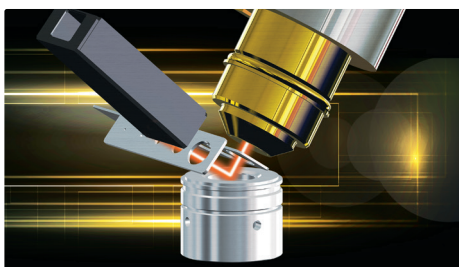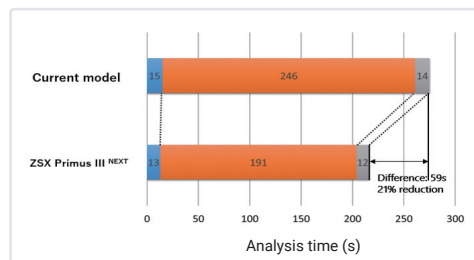
Avoid powder spills into the optical chamber

SAMPLE THROUGHPUT

Sample throughput has been improved by:

- High-speed data processing
- Multi-tasking control of drive units

Example: quantitative analysis of 16 elements in a cement sample. Time can be reduced by about 21% compared to the previous model.

- ■ The sample is moved to the spectrometer chamber after being evacuated in the dual position turret
- ■ Measurement of 16 elements (goniometer drive, crystal, detector and divergence slit exchange under iso-power control)
- ■ Transport of sample to outlet after measurement completion and brought under atmospheric pressure

IMPROVED PRECISION THROUGH HIGHER COUNTING LINEARITY

A DMCA (Digital Multi Channel Analyzer, 1024 channels) enables high-speed analysis by faster data collection. High-speed digital processing improves the accuracy of analysis by increasing the counting linearity and maximum counting rate (linearity: less than 1% relative error).

- • Scintillation counter   1,800 kcps
- • Gas flow proportional counter   3,000 kcps
- • Gas-sealed proportional counter   3,000 kcps
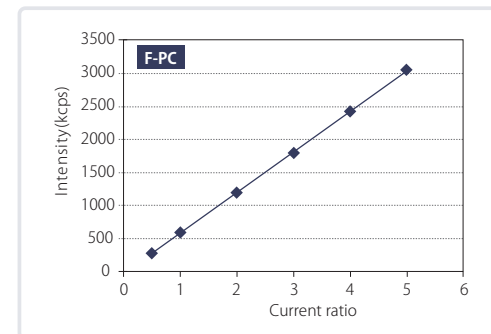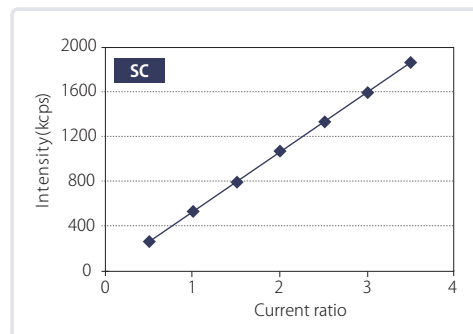
GAS-FREE INSTALLATION POSSIBLE

Optional gas-sealed proportional counter for light element analysis (S-PC LE): $_8O$ - $_{28}Ni$

- • In case P10 gas is difficult to obtain
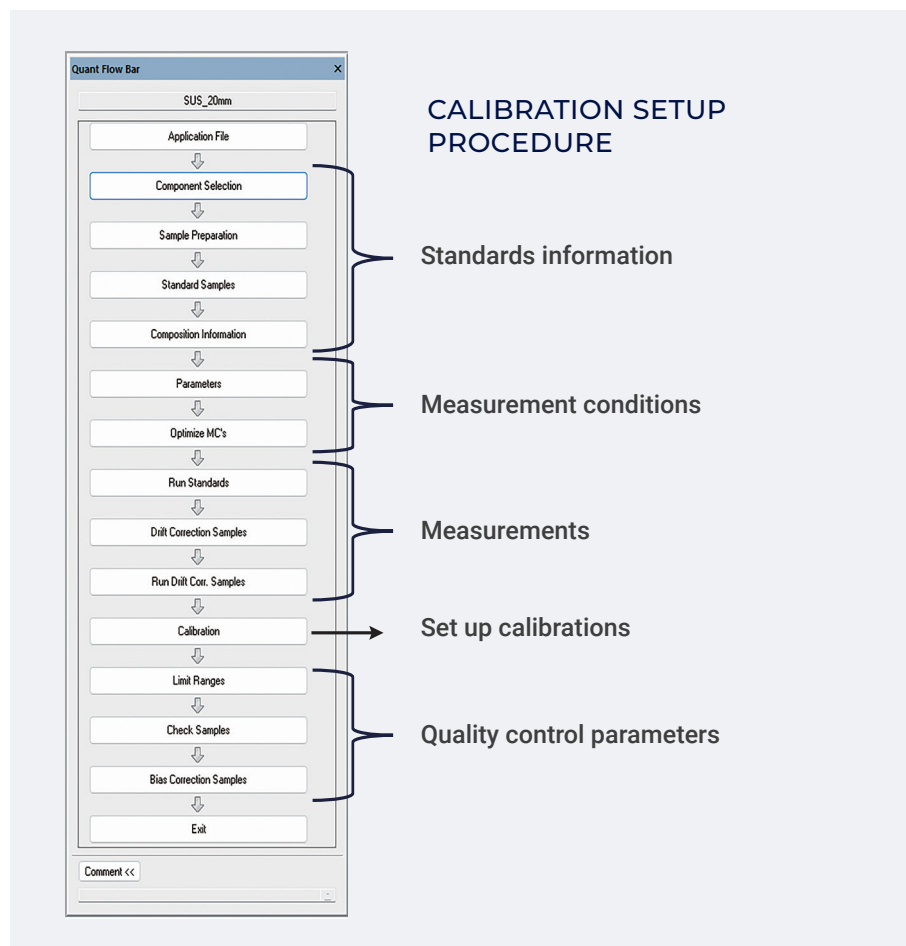- • Simpler, gas-free installation

SOFTWARE FEATURES AND BENEFITS

ZSX GUIDANCE SOFTWARE

- Provides strong user support, generating measurement conditions and providing calibration assistance to both experienced and inexperienced WDXRF users.

- Integrated software for day-to-day analysis and service or maintenance purposes assures user friendliness.

- Customize software access permission levels according to operator experience to avoid accidental misuse of software and protect calibration settings from being changed.

- Powerful standardless FP software package (SQX) for the analysis of completely unknown samples.

FLOW BAR SCHEME

Intuitive application creation and configuration using the flow bar

CALIBRATION SETUP PROCEDURE

Quant Flow Bar
SUS_20mm
Application File
Component Selection
Sample Preparation
Standard Samples
Composition Information
Parameters
Optimize MC's
Run Standards
Drift Correction Samples
Run Drift Corr. Samples
Calibration
Limit Ranges
Check Samples
Bias Correction Samples
Exit

Comment <<

Standards information

Measurement conditions

Measurements

Set up calibrations

Quality control parameters

IMPROVED RELIABILITY OF ANALYTICAL RESULTS

The estimated standard deviation from a single measurement is shown next to the analysis result:

The table below compares the estimated standard deviation from a single measurement and the actual standard deviation from 10 repeated measurements. The estimated and actual standard deviations are very similar.

unit：mass%

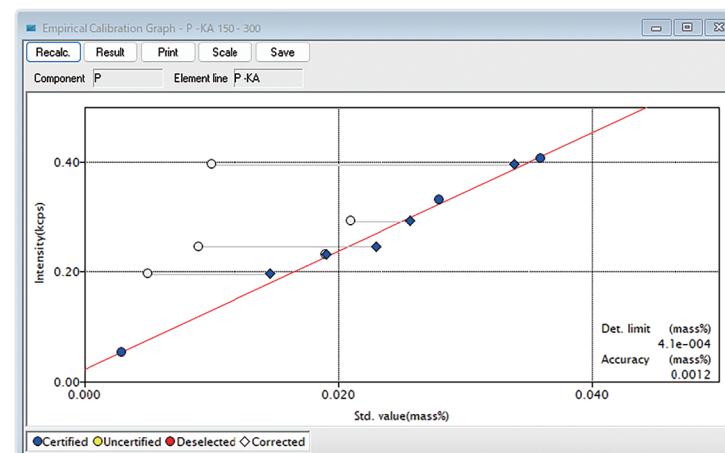|		Mn	P	S	Si	Ni	Cr	Mo
single measurement	analysis result	1.202	0.020	0.008	0.908	15.18	15.77	0.470
	Std deviation	0.0023	0.0004	0.0003	0.0030	0.0088	0.0117	0.0008
10 repeated measurements	average analysis result	1.205	0.020	0.007	0.905	15.18	15.76	0.471
	Std deviation（actual）	0.0027	0.0002	0.0001	0.0030	0.0082	0.0077	0.0006

SPECTROMETER PARAMETERS IN RESULTS VIEW

- Analytical results may depend strongly on the status of the X-ray spectrometer's physical parameters: vacuum, temperature and detector gas flow rate.
- The ZSX software results display shows the most important parameters and notification is displayed in case of a hardware error.
- Quickly verify analysis results obtained when a parameter is out specification.

AUTOMATIC CALCULATION OF DETECTION LIMITS

- The Lower Limit of Detection (LLD) is calculated using the measurement conditions and is directly displayed in the calibration curve.
- The LLDs for each standard is obtained taking spectral interferences into account.
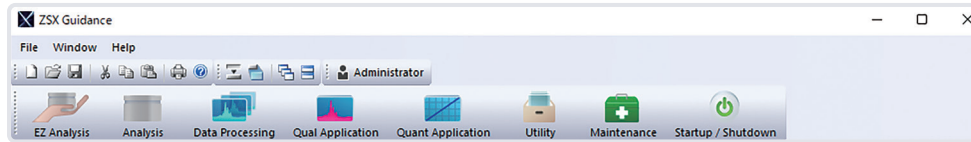- The results display window also shows LLDs as "Det. limit".
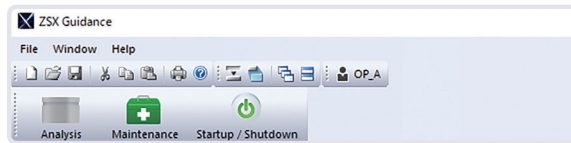
USER ACCESS LEVEL SETTING

Setting of operator access levels to avoid human errors:

- Changing or deleting calibrations
- Editing analytical results
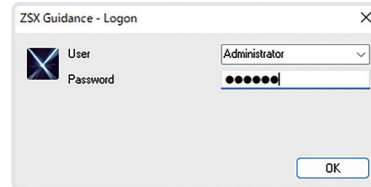- Unwanted service actions

Depending on the user level setting, certain software functions will be available:
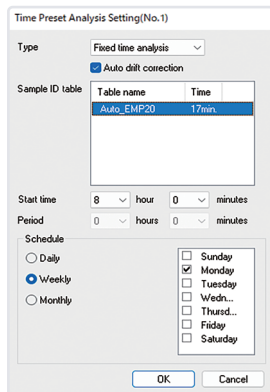

Full menu

Routine analysis

ZSX Guidance logon window

TIME-SAVING DAILY ANALYSIS MANAGEMENT TOOL

Scheduler function:

- Automatic start-up of the spectrometer
  - X-rays on
  - Aging
  - PHA measurement
- Automatic Quality Check (QC) and Drift Correction (DC)

APPLICATION SHARING AND SUPPORT
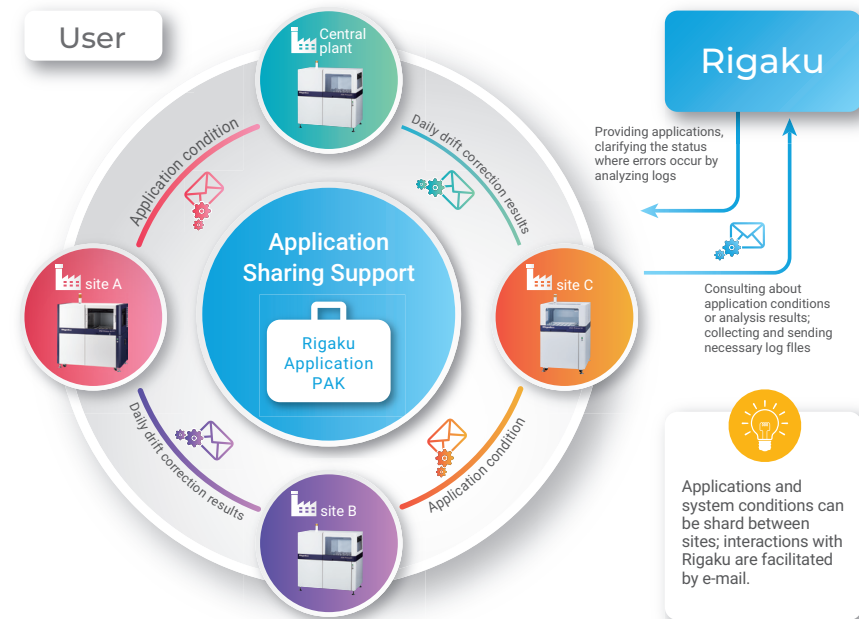
Plants with similar X-ray spectrometers can share applications between systems

- Transfer of knowledge
- Increased productivity by reducing the workload of less experienced users

The data pack function makes it easy to check analysis methods, analyze error log files, or monitor spectrometers even at remote sites.

SPECIFICATIONS

ZSX Primus III NEXT		
Analytical range		$_8$O - $_{96}$Cm standard ($_4$Be - $_{96}$Cm Optional[*1])
Spectral method		Wavelength dispersive
Atmosphere		Vacuum
X-ray generator system	X-ray tube	End window type Rh target 3 kW
	High voltage generator	High-frequency inverter system
	Heat exchanger	Pure water circulation supplier (built-in)
Spectrometer	Irradiation method	Tube-above
	Sample changer	Expandable sample changer with up to 48 positions
	Sample inlet	Air lock system
	Maximum sample size	ϕ 52 mm × 30 mm (H)
	Primary filter	Ni400, Ni40, Al125, Al25
	Analysis area diaphragm	4 sizes automatic exchange mechanism 35, 30, 20 and 10 mm
	Primary Soller slit	3 positions automatic exchange machanism Standard and fine slits / Optional: Ultralight element slit
	Goniometer	θ-2θ independent driving mechanism
	Continuous scan	0.1°~240°/min
	Crystal exchanger	10 crystal automatic exchange mechanism
	Analyzing crystal	Standard: LiF, 200, PET, RX26
		Optional: Ge, LiF, 420, LiF(220), RX9, RX4, RX35, RX40, RX45, RX61, RX61F, RX75
	Vacuum system	One shared vacuum pump between sample- and analyzing chamber.
		Sample powder trap filter
Counting system	Pulse height analyzer	Digital multichannel analyzer (DMCA)
	Detector	SC (Scintillation counter)
		F-PC (Gas flow proportional counter) Optional: S-PC LE (Gas sealed proportional counter: does not require P-10 gas)

*1 depending on crystal configurations

INSTALLATION REQUIREMENTS

Required power supply	Instrument: Single (200 - 240 V), three phase (200 V) 50/60 Hz 40A Personal computer: 1-phase, 100-240 V, 10A
Grounding specification	30 Ω or below grounding (independent)
Cooling water	Temperature: Lower than 30°C Pressure: 0.29 - 0.49 MPa Flow: More than 5 l/min Quality: Equivalent to drinking water
Drained water	Gravity drain
Room temperature	18 - 30°C Daily variation within ±2°C
Relative humidity	75% RH or less
Vibration	Less than 2 m/s^2 Not detectable by a human
Gas for detector	P10 Gas (argon 90% methane 10% mixed gas) Pressure 0.15 MP a, 7 ml/min Not required if S-PC LE is selected

SPECTROMETER DIMENSIONS