

Benchtop XRD diffractometer





The new **MiniFlex** is available in two models. The **MiniFlex** 600 is the most powerful benchtop XRD diffractometer available while the **MiniFlex** 300 is a self-contained system that does not require a water chiller.

MiniFlex: a benchtop XRD system that will redefine the way you think about X-ray diffraction

X-ray diffraction (XRD) is a powerful and well-established technique for analyzing materials. Industries as diverse as cement, catalysis, petroleum, energy and pharmaceuticals rely on XRD to characterize materials from basic research all the way to quality control. It is also an important scientific technique taught to students who study geology, material science, chemistry and crystallography.

The **MiniFlex** is a fully featured, general purpose X-ray diffractometer. It can perform **qualitative** and **quantitative** analysis of polycrystalline materials. In qualitative analysis, the instrument is used to identify unknown substances (chemical compounds or "phases") by comparing experimental diffraction data against a database of known phases. In quantitative analysis, it is used to characterize solid mixtures to determine relative abundance of crystalline compounds.

Specialized measurements that can be made include:

- % crystallinity
- Crystallite size and strain
- Lattice parameter refinement
- Rietveld refinement for structural characterization

Ahead of its time

The original **MiniFlex** was based on the idea that a compact XRD instrument could be designed so that a novice could use it to produce results as good as a trained diffractionist could obtain on a large multi-purpose, XRD diffractometer. Today, when everything seems to be getting smaller and easier to use, the **MiniFlex** continues to be ahead of its time. Referenced in thousands of scientific publications and over 500 patents, the **MiniFlex** is a very serious machine.

More power More flexibility

More results

5th Generation MiniFlex

The new **MiniFlex** retains the characteristics that have made it popular for so many years:

- Compact size allows it to be installed on a lab bench
- Priced at about ¹/₂ the cost of a traditional floor standing diffractometer
- Easy to use, operate, and maintain
- Able to use pre-existing utilities

But in addition, the **MiniFlex** is now available in two models. Operating at 600 watts, the **MiniFlex** 600 is **twice as powerful** as other benchtop models. This means that you can do your work faster and improve your overall throughput. A variant model, the **MiniFlex** 300, runs at only 300 watts and, because of the reduction in power, does not require an external heat exchanger.

Only the **MiniFlex** offers you options that give you maximum flexibility in a benchtop package. Is **speed** your biggest issue? The optional **D/teX Ultra** high-speed detector coupled with the new higher power X-ray source will give you the fastest possible data collection in a compact diffractometer. Perhaps you are most concerned with **sensitivity** when measuring trace phases. The optional graphite monochromator, coupled



with the standard scintillation counter, maximizes sensitivity by optimizing peak to background ratios, in addition to eliminating the fluorescence from Fe, Ni, Co, and Mn containing materials. Or perhaps **resolution** is your biggest issue. Incident and diffracted beam slits can be selected to provide the resolution that you need. Or what about **throughput**? The **MiniFlex** is the only benchtop XRD system with an available sample changer.



The red pattern illustrates background reduction when using the monochromater.

Previous **MiniFlex** models have been successfully integrated into many government and commercial mobile and field labs. With the addition of the **MiniFlex** 300 to the product line, the integration becomes much easier since no water chiller is needed, and perhaps even better is the fact that protocols established for the previous **MiniFlex** will not need to be rewritten.



The combination of a 1D high speed detector and an automatic sample changer is perfect for high-throughput workflow.

Analysis of materials by X-ray diffraction

Software

Analysis software

PDXL is Rigaku's full-function powder diffraction analysis package. Its modular design and **automated flow bar** user interface has revolutionized access to the power of XRD for the non-expert user.

The latest version of **PDXL** includes some important new functions, including a fundamental parameter method (FP method) for more accurate peak calculation, phase identification using the Crystallography Open Database (COD), and a Wizard for *ab initio* crystal structure analysis.

PDXL's rich feature list includes:

- Search/Match analysis
- Percent crystallinity
- Cell refinement
- Indexing
- Ab initio structure solving
- Quantitative analysis
- Crystallite size and strain
- Whole pattern profile fitting
- Rietveld refinement





Optional attachments

D/teX Ultra 2

1D high-speed detector for fast, high resolution scanning.



Rigaku

Graphite monochromator

When used with a scintillation counter, the graphite monochromator optimizes sensitivity by lowering the background level. It improves Signal to Noise by eliminating fluorescence from Mn, Fe, Co, and Ni containing materials.



Automated sample changer

ASC-6 Automatic 6-position sample changer with spinner.



Specimen rotation attachment

The sample rotation stage allows continuous rotation to minimize the effects of preferred orientation.



Air-sensitive sample holder

An air-sensitive sample holder is available for users studying materials that might degrade in the presence of air.



Sample holders

Various sample holders are available to meet the specific needs of each lab.





More power

More flexibility

More results



Co-crystals and polymorphs

Exploration and petrochemicals



Legacy of innovation

Geology, mining and cement

Education and materials R&D

The proof is in the results

A Google Scholar search of publications (excluding patents) referencing the Rigaku **MiniFlex** finds over **5000 articles**. Journals as prestigious and diverse as the **Journal of the American Chemical Society, Journal of Orthopaedic Research, Thin Solid Films, Vibrational Spectroscopy, Biotechnology Letters, Catalysis Communications**, and **Materials Letters** reference the **MiniFlex**.

A Google patent search indicates over **500 patents** include reference to the Rigaku **MiniFlex**. These patents cover a wide range of inventions, including polymorphs, lithium electrochemical cells, nanocomposites, conductive ink, wire coating, pharmaceutical co-crystal compositions of drugs, tires, conductive materials, cement, ceramics, pharmaceutical formulations, solar cells, polymers, thin films, super capacitors, phosphors, coatings, catalysis, and medical devices.

Rigaku introduced the **MiniFlex** as the world's first benchtop XRD system in 1973. After almost 40 years, Rigaku has installed hundreds of systems globally. With proven performance, high reliability, and a compact footprint, the **MiniFlex** has redefined the concept of X-ray diffraction with a large base of enthusiastic customers around the world.

Options

	MiniFlex600	MiniFlex300		
Attachments	Specimen rotation attachment			
	Automatic sample changer for 6 samples			
	D/teX Ultra 1D high-speed detector			
	Diffracted beam monochromator			
	Air sensitive sample holder			
	Zero background sample holder			
	External heat exchanger	Internal heat exchanger		

More power

More flexibility

More results



QC, corrosion and failure analysis

Paints and coatings

Forensics and chemistry

Cosmetics and food science

Specification and utility requirements

		MiniFlex600	MiniFlex300	
Software	Instrument control	MiniFlex Guidance PDXL Basic Analysis package PDXL Qualitative Analysis package PDXL Quantitative Analysis package		
	Data analysis			
PDXL Comprehens (Crystallite size and lattice strain, lat		PDXL Comprehensive Analysis package		
		ice constant refinement, crystallinity)		
		PDXL Rietveld Analysis package		
		PDXL Structure Analysis package		
		(Indexing, space group determination, initial structure determination)		
		ICDD, ICSD, and COD databases available		
Generator	Maximum power	600 W	300 W	
	Tube voltage	40 kV	30 kV	
	Tube current	15 mA	10 mA	
	Shutter	Rotary shutter linked to interlock Cu, Co, Fe, or Cr		
	X-ray tube			
Optics	Divergence slit	Fixed or Variable		
Scattering slit Fixed Receiving slit Fixed		Fixed		
		ed		
	Filter	Kβ Foil filter Graphite		
	Monochromator (optional)			
Goniometer	Туре	Vertical		
	Radius	150 mm nge -3 to 145° (θ-2θ) eed 0.01 to 100°/min (2θ)		
	Scanning range			
	Scanning speed			
	Minimum step width 0.005° (20)		(2θ)	
	Accuracy	±0.02°		
Detector	Scintillation counter	Nal scintillator		
	D/teX Ultra (optional)	High speed silicon strip detector		
Dimensions	Main body	560 W x 700 H x 460 D (mm)	560 W x 700 H x 530 D (mm)	
Weight	Main body	Approx. 80 kg	Approx. 90 kg	
Power supply	Main Body	1¢ AC100 to 240V ±10%	1¢ AC100 to 240V ±10%	
		50/60Hz ±1% 1.0 kVA	50/60 Hz ±1% 0.7 kVA	
	PC 1\$\phi AC100V \pm 10%		V ±10%	
		50/60 Hz ±	50/60 Hz ±1% 0.7 kVA	

Miniflex

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