APD 2000 PRO

POWDER X-RAY DIFFRACTOMETER

INSTALLATION REQUIREMENTS

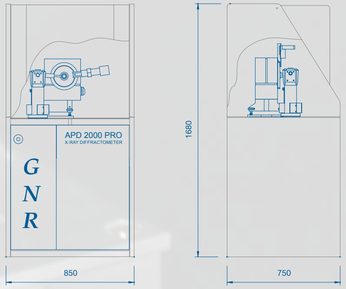
Electrical system
Power connection: 220 Vac +/- 10%, 50 or 60 Hz, single phase
Maximum mains current: 40 A
Main fuse: 32 A
Maximum power consumption: 5 kVA
Ground terminal: 6 mm²

Power supply voltage fluctuation must not exceed 10%

Cooling water
Minimum flow rate: 4 l/min
Maximum pressure: 6 bars
Maximum inlet temperature: 35° C (minimum depends on dew point)

If the flow rate is lower than 4 l/min, the safety circuit for protection of the X-ray tube is activated, disabling the X-ray generating circuit. When minimum conditions of flow-rate cannot be fulfilled, use the water chiller, available as an optional extra.

EXTERNAL DIMENSIONS



Total weight: 220 Kg

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Local Agent

In relation to the process of continuous development, GNR reserves the right to change the specification of the instrument without previous notice at any time.

NEW

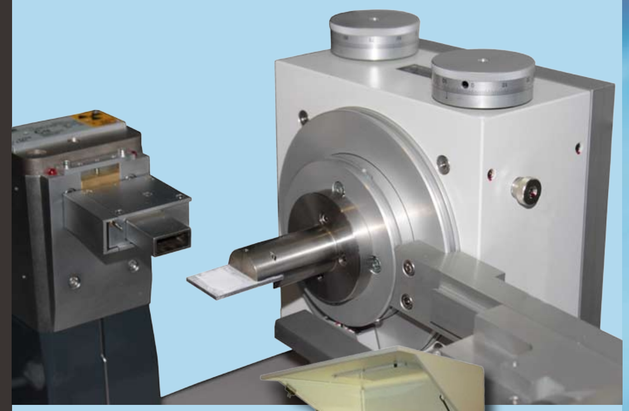
APD 2000 PRO

POWDER X-RAY DIFFRACTOMETER

GNR OPTICA

ANALYTICAL INSTRUMENTS GROUP

25 years of technology



Highly accurate
and attractively priced...

APD 2000 PRO

POWDER X-RAY DIFFRACTOMETER

The latest powder X-ray diffractometer developed by GNR

GNR is a worldwide market leader in supplying advanced X-ray (XRD, XRF) and optical emission spectrometer (OES) systems for complete solutions in structural and elemental analysis.
We can fit well the analytical needs of customers in material research, quality control, process analysis and life science.
These analytical methods provide elemental composition of solids and liquids as well as structural parameters of powders, thin films and bulk materials.
The modularity and the flexibility of the GNR X-ray equipments allows to start with an entry-level system which can be upgraded to meet new requirements.
We can supply a wide range of X-ray sources, optics, sample holders, detectors and configurations to satisfy all the analytical needs.
Phase analysis and identification is the study of the different polycrystalline materials within an analytical sample. One phase is separated from another due to its unique powder diffraction pattern which arises from its unique combination of composition and crystal structure. The analysis is applicable to all types of crystalline materials and can be either restricted to identification only or extended to full quantitative analysis.
The APD 2000 PRO is designed to be the best solution for phase and structural analysis of powder samples.

The standard configuration is the well known Bragg-Brentano geometry and it is the best optical configuration for most applications in X-ray powder diffraction.
High and low temperature chambers and a humidity device can be easily mounted on the omega stage.
The APD 2000 PRO diffractometer can be equipped with various attachments for your special field of research. In addition, custom-designed accessories can be manufactured to your specifications.
Great attention has been given to operator safety: a series of devices are used to prevent accidental injury from irradiation and an X-ray proof cabin covers the working table.
The APD 2000 PRO offers solutions for a wide range of analytical requirements, from routine qualitative and quantitative phase analysis, non-ambient analysis, retained austenite quantification, structure solution and refinement, crystallite size and crystallinity calculations.
Fields of application include: environment, soil/rocks, clay, minerals, ceramics, cements, glasses, petroleum, catalysts, polymers, agricultural science, biosciences, chemicals, pharmaceuticals, cosmetics, paints.

APD 2000 PRO
POWDER X-RAY DIFFRACTOMETER

High-precision, vertical/horizontal goniometer

High speed rate (1000°/min) and high precision angle reproducibility (±0.0001°) provide fast measurement and highly reliable data.
Stepper motors with optical encoders ensure extremely precise angular values.
Easy to handle: compact dimensions permit vertical and horizontal mounting by utilising a suitable optical stand.
The compact working table reduces the installation space requirements.
The X-ray beam collimation is obtained by variable slits that guarantee a perfect alignment of the beam in the vertical direction, while in the horizontal direction the divergence is limited by Soller slits.
The bracket of the incident beam slits, is mounted on the X-ray tube shield; this greatly facilitates the alignment, that is already simplified by the micrometric movements of the horizontal and vertical stand.

Features

· Qualitative and quantitative powder X-ray diffractometer
· High stability X-ray generator through precision feedback control circuits
· Automatic ramp of the high voltage and emission current to preset values
· Ceramic X-ray tubes with high reproducibility and stability of focus position
· Microfocus tubes and policapillary collimators
· Focusing $K\alpha_1$ Johannson monochromators for low background and high resolution
· Flat and curved secondary graphite monochromators suitable for Ag, Cr, Fe, Cu, Co and Mo radiations
· Possibility of changing automatically from transmission to reflection mode
· High precision, high speed goniometer controlled by optical encoders
· Traditional, rotating, multi sample and capillary sample holders
· Scintillation counters, silicon strip and energy dispersive detectors
· Non-ambient analysis, low and high temperature chambers, humidity device
· Double safety circuit
· Radiation enclosure with high accessibility and visibility of the goniometer
· Crystallographic software including Rietveld's refinement

APD 2000 PRO - technical data

X-ray generator	Maximum output power	3 kW (option: 4 kW)
	Output stability	< 0.01 % (for 10% power supply fluctuation)
	Max. output voltage	60 kV
	Max. output current	60 mA (option: 80 mA)
	Voltage step width	0.1 kV
	Current step width	0.1 mA
	Ripple	0.03% rms < 1kHz, 0.75% rms > 1kHz
	Preheat and ramp	Automatic preheat and ramp control circuit
	Input voltage	220 Vac +/- 10%, 50 or 60 Hz, single phase
	Size	Width 48.3 cm, height 13.3 cm, depth 56 cm
X-ray tube	Type	Glass (option: ceramic), Cu anode, long fine focus (options: any kind of X-ray tube)
	Focus	0.4 x 12 mm LFF (options: 0.4 x 8 mm FF; 1 x 10 mm NF; 2 x 12 mm BF)
	Max. output	3.0 kW
Goniometer	Configurations	Vertical and horizontal Theta/2Theta geometry
	Measuring circle diameters	350 - 400 mm
	Vertical Scanning angular range	- 60° < 2 theta < + 168° (depends on accessories)
	Horizontal Scanning angular range	- 110° < 2 theta < + 168° (depends on accessories)
	Smallest selectable stepsize	0.0001°
	Angular reproducibility	± 0.0001°
	Modes of operation	Continuous scan, step scan, theta or 2 theta scan, fast scan, theta axis oscillation
	Variable divergence slits	0 - 4°
	Variable anti-scatter slits	0 - 4°
	Variable receiving slits	0 - 4°
	Soller slits	2°
Detector	Type	Scintillation counter NaI (options: YAP(Ce); multi strip and CCD detectors)
	Countrate	2 x 10^6 cps (NaI); 2 x 10^7 cps (YAP(Ce));
Case	Dimensions	Width 850 mm, heigh 1680 mm, depth 750 mm
	Leakage X-rays	< 1 mSv/Year (full safety shielding according to the international guidelines)
Processing unit	Computer type	Personal Computer, the latest version
	Items controlled	X-ray generator, goniometer, sample holder, detector, counting chain
	Basic data processing	Polynomial least squares smoothing. Fourier smoothing. Search for Peaks (automatic and manual). Spline background subtraction. Single peak analysis (area, FWHM, centroid, background). Marquardt fit (with pseudo-Voigt and Pearson VII curves, Ka2 contribution, weighted sum of squares). Sum and multiply by a constant. Scale normalization. Zoom. Graphical windows. Overlap and comparison of diffractograms. Multiview function. Cursor scan. Creation of graphic files .BMP ICDD-PDF2 Card Overlap. Creation of calibration curves. Analysis of unknown samples. Qualitative and quantitative phase analysis. Rietveld analysis, crystalline structural analysis, crystallite size and lattice strain, crystallinity calculation.

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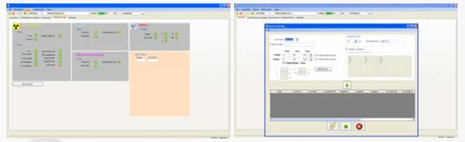
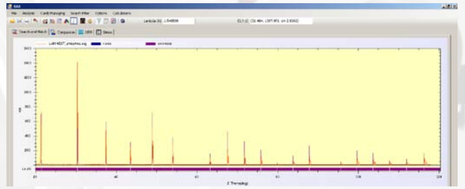
Application software

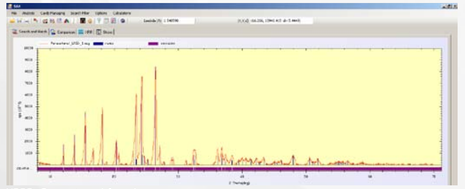
Data collection Programs
GNR offers a large variety of acquisition programs, for standard as well as for customized hardware configurations. The list includes the programs for powder and high resolution diffractometers, retained austenite, data acquisition of stress (plane and triaxial) and thin films (XRR and GID). The programs can control: X-ray generator and tube, instrumental alignment, multi purpose sample holder, scintillation counter, linear silicon strip detector, solid state detectors, high/low-temperature, humidity chambers and other devices.



SAX
Single peak analysis; peak treatment. Background subtraction, smoothing, deconvolution and peak localisation. Structural Analysis, Crystallite Size, Lattice Strain, Reflectometry, Quantitative Analysis.



XRPD: LaB_6 NIST STD 660a / Detector: Dynamic scintillation NaI detector



XRPD: Paracetamol form I
Detector: CELERIX - One-dimensional silicon strip detector. Acquisition time: 120s