AXRD® BENCHTOP
Powder X-ray Diffractometer

IMPROVE YOUR SCIENCE™

X-ray Diffraction Systems & Services

PROTO
The AXRD Benchtop is easy to use and provides accurate and reliable measurement results with comparable speed to full-size laboratory units. Equipped with our powerful hybrid photon counting detector, the AXRD Benchtop has extremely fast data collection capabilities. Collect low-resolution scans in 3 minutes. Collect high-resolution scans in 15 to 30 minutes.

**HIGH ACCURACY BENCHTOP POWDER DIFFRACTION**

The PROTO AXRD Benchtop powder diffraction system provides a low-cost alternative for powder diffraction. With an achievable FWHM peak resolution of < 0.04° 2θ and an angular accuracy of < ± 0.02° Δ2θ over the full angular range, the AXRD Benchtop provides the necessary level of performance for even the most demanding x-ray diffraction material investigation.

- Phase Identification
- Rietveld Refinement
- Crystallite Size & Strain
- Thin Films & Coatings
- Glancing Incidence
- Quantitative Phase Analysis
- Percent Crystallinity
- Structure Analysis
- Rocking Curves
EDUCATION AND RESEARCH
The AXRD Benchtop is excellent for supporting R&D efforts and training in many fields of study such as geology, chemistry, physics and engineering.

PAINTS AND COATINGS
Quality control of pigments and extenders.

METAL CORROSION AND FAILURE ANALYSIS
Analysis of scale and corrosion products.

CHEMISTRY AND FORENSICS
Characterize unknown materials and support R&D efforts in the laboratory.

FOOD AND COSMETICS
Food mixtures and cosmetic powders are monitored using XRD to ensure safety and quality control.

PHARMACEUTICALS
Application in drug discovery, polymorph identification, and quality control of formulations.

MINERALS, MINING AND CEMENT
Determine the composition of raw material, clinker and cement products.

PETROCHEMICALS
Analysis of solids obtained during the drilling process can be used to direct drilling efforts.
COMPREHENSIVE BENCHTOP POWDER X-RAY DIFFRACTION

The AXRD Benchtop has everything you need for phase identification, quantitative phase analysis, percent crystallinity, crystallite size and strain, Rietveld refinement, characterization of thin films, and structure analysis.

With advanced detector options, multiple sample stages and holders, powerful software and database options, the AXRD Benchtop provides the versatility you need for your measurement requirements.

XRD - A POWERFUL ANALYSIS TECHNIQUE
Powder samples are exposed to a beam of monochromatic x-rays to generate an x-ray diffraction pattern. This pattern is a unique fingerprint of the material and provides structural information about the material.

These patterns can be compared to known entries in databases such as the ICDD PDF 4+ to identify the material.

EXCELLENT RESOLUTION, ACCURACY & DATA QUALITY

Scan of Lanthanum Hexaboride (LaB₆)

Low Angle Scan of Silver(I) Iodobenzenate Nanocrystals

EASY AND CONVENIENT TO USE

1. INTEGRATED WATER COOLING. Tank, pump, and heat exchanger are all integrated into the AXRD.
2. INCLINED X-RAY TUBE. Prevents powders from spilling by reducing sample tilt.
3. SAFETY WARNING LIGHTS. X-ray on, shutter open, status lights for user safety.
4. FLEXIBLE SLIT OPTIONS. Divergence, anti-scatter, Soller, and receiving.
5. SAMPLE HOLDERS. Shallow and deep cavities, Si zero background plates, Si zero background plates with cavity, air-sensitive, and custom sample holders.

ACCESSORIES

1. TEMPERATURE STAGE/ENVIRONMENT CHAMBER. Heat samples from room temperature to 500°C or cool sample to -10°C in a controlled environment under inert gas such as nitrogen (N₂) or argon (Ar).
2. VARIABLE PRESSURE STAGE. Investigate material-gas interactions directly at pressures ranging from 10.3 atm (vacuum) up to 30 atm (440 psig).
3. ROTATING SAMPLE STAGE. Variable speed sample spinner for improving particle statistics of samples with preferred orientation.
4. SAMPLE CHANGER. Our automated six-position sample changer enables unattended operation of the AXRD. Each position has a built-in rotating stage.
PHOTON COUNTING DETECTORS - THE ULTIMATE IN ACCURACY AND SPEED

All detector options for the AXRD Benchtop are Photon Counting Detectors. Choose between our single channel silicon detector or our linear strip Hybrid Photon Counting Detector. In either case you will ensure that every photon is correctly captured and processed to ensure low-noise and high-counting rates.

DECTRIS® HYBRID PHOTON COUNTING DETECTOR

HIGH SPEED DATA COLLECTION
- High speed solid-state linear detector
- Simultaneous multiple channel collection enables collection times up to 100 times faster than a scintillation counter
- Direct detection of x-rays using silicon strip technology
- Global count rate of 10⁶ count/s
- High-speed collection times
- 32 mm x 8 mm sensor area
- Excellent signal-to-noise ratio and very high dynamic range
- Fluorescence suppression mode

SPD SILICON POINT DETECTOR

XRD & XRF IN ONE CONVENIENT PACKAGE
- Energy discriminating single channel solid-state detector
- Recommended for samples with high fluorescence (i.e., Fe and Co)
- Eliminates need for a diffracted beam monochromator
- Kα suppression capabilities
- Powder pattern collection using Kα₁₂ or Kα
- Use XRF spectrum to assist in chemical identification of sample and improve search match results

SOFTWARE - XRDWIN PD

Our complete x-ray diffraction software package for both data collection and analysis of powder patterns is the perfect solution for qualitative and quantitative analysis. Some of XRDWIN’s unique features include: Instrument warm-up and control, flexible data collection options including segmented and batch mode collection, pressure and temperature environmental cell control, peak search, profile analysis including peak, crystallite size and strain, crystallinity, intensity ratio method, spike methods, and Rietveld refinement. Search/match for ICDD PDF databases and the COD database. MDI Jade interface also available.

JADE

For advanced analysis of your diffraction patterns we offer MDI’s Jade 2010 software. This program integrates with XRDWIN PD to provide seamless access to advanced analysis tools such as Rietveld refinement.
**ICDD PDF-2**
Over 298,000 inorganic and organic experimental powder data entries for rapid material analysis.

**ICDD PDF-4+**
Over 398,000 inorganic and organic entries. Includes atomic coordinates for Rietveld analysis.

**ICDD PDF-4/ORGANICS**
Over 525,000 organic and organometallic entries. Designed for the pharmaceutical, regulatory, specialty chemical, biomaterials and forensic fields.

**ICDD PDF-4/MINERALS**
Over 45,000 minerals and related materials. A subset of the PDF-4 database.

**MOI MINERAL**
Over 9,000 minerals and related materials.

**COD**
Open-access collection of over 390,000 crystal structures of organic, inorganic, metal-organic compounds and minerals.

**Databases**
Our XRDWIN PD software can interface with most common x-ray diffraction databases. We can ensure that you have the best database for identification of your materials.

**ICDD PDF-2**
Over 298,000 inorganic and organic experimental powder data entries for rapid material analysis.

**ICDD PDF-4+**
Over 398,000 inorganic and organic entries. Includes atomic coordinates for Rietveld analysis.

**ICDD PDF-4/ORGANICS**
Over 525,000 organic and organometallic entries. Designed for the pharmaceutical, regulatory, specialty chemical, biomaterials and forensic fields.

**ICDD PDF-4/MINERALS**
Over 45,000 minerals and related materials. A subset of the PDF-4 database.

**MOI MINERAL**
Over 9,000 minerals and related materials.

**COD**
Open-access collection of over 390,000 crystal structures of organic, inorganic, metal-organic compounds and minerals.

**Maintenance & Support**
At PROTO we understand the importance of meeting deadlines and adhering to timelines. We offer support and training for all of our instruments and software, and are diligent about providing the service you require in an efficient manner.

Our customer service is provided from the same offices and technicians that designed and developed your AXRD benchtop diffractometer.

**Proto’s High Quality X-ray Tubes**
Our ceramic/steel x-ray tubes are produced in-house to provide you with the best quality, performance, warranty and support. These durable, stable and high flux tubes provide years of accurate measurements. For optimal results we utilize a wide range of anodes to ensure the best possible x-ray diffraction peaks on your materials.

**Available anodes: Cu, Cr, Co, Mo**
**MAIN OFFICES**

**USA**  
PROTO Manufacturing Inc.  
12350 Universal Drive  
Taylor, Michigan  
48180-4070  
Tel 1-734-946-0974  
info@protoxrd.com

**CANADA**  
PROTO Manufacturing Ltd.  
2175 Solar Crescent  
Oldcastle, Ontario  
N0R 1L0  
Tel 1-519-737-6330  
protocanada@protoxrd.com

**JAPAN**  
PROTO Manufacturing K.K.  
3-1-22-402 Nishi Inazawa  
Aichi  
492-8218  
Tel +81 587-81-6531  
info@protoxrd.jp

**CHINA**  
EPCO Test Tech LTD  
B2301 Tomson Center  
188 Zhangyang Rd.  
Pudong, Shanghai, 200120  
Tel +86 21 38870960  
sales@epco.com.cn

**INDIA**  
Elico Marketing Pvt. Ltd  
57, Phase-V, Near Telephone Exchange  
KPHB, Kukatpally, Hyderabad  
500 072  
Tel +91 40 2315 3322, 2315 3388  
info@elicomarketing.com

**EUROPE**  
METLAB - PROTO EUROPE  
ul. Ibn Siny Awicenny 14  
Wroclaw, Poland  
54-611  
Tel +48 (885) 200 993  
protoeurope@protoxrd.com

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**PROTO**  
www.protoxrd.com

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