

STOE Position Sensitive Detectors



The new curved Imaging Plate Position Sensitive Detector (IP-PSD), developed for STOE's transmission-/Debye-Scherrer diffractometers, provides all its advantages when shortest measuring times are in demand. Full patterns of powder samples with brilliant peak to background ratios can now be taken within a minute.

This fast data collection supports standard phase analysis, especially in combination with the sample changer, as well as temperature depending investigations and kinetic studies. With its angular aperture of 140° the IP-PSD even allows snapshots of rapid phase transitions – a feature no moving detector can provide.

Due to the imaging plate technology the IP-PSD is free of any maintenance and can be used with every available X-ray anode material.

The linear PSD offers highest data accuracy and excellent resolution in combination with fast scanning speed. This makes STOE's linear PSD one of the most flexible detectors for powder diffractometry.

Whether transmission-, Debye-Scherrer mode or Bragg/Brentano geometry, whether Ag, Mo, Cu, Co or Fe-radiation, this wire counter offers universal application from elementary phase analysis to stress/strain investigations or structure solution from powder data.

Both detector systems are provided with counting electronics, ADC board for PCs and all necessary cables. They exhibit the well known STOE advantages, high robustness, a long lasting life span and outstanding data quality. And there is no either-or, linear PSD and IP-PSD are fast and easily to exchange against each other.

Highest accuracy The most flexible linear PSD can be used with all STOE powder diffractometer systems.

In combination with STOE's well known STADI P series it is the detector of choice for Rietveld refinement and structure solution from powder data. With its excellent resolution $< 0.06^\circ$ FWHM in 2θ even datasets of samples with monoclinic or triclinic cells lead to excellent results in lattice and atomic parameters up to reasonable values for anisotropic temperature factors during refinement.

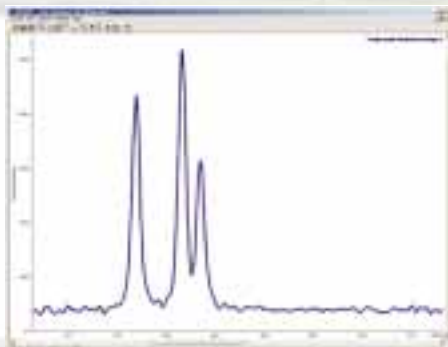
With the possibility to measure about $5-7^\circ$ in 2θ at once the linear PSD is also a rapid alternative to the scintillation counter with STOE's θ/θ - or Bragg/-Brentano diffractometers.

The measuring time for residual stress determinations or pole figures in texture analysis is reduced drastically.



STOE linear PSD

Its online intensity display makes the linear PSD a powerful tool for the alignment of STOE powder diffractometers.



"3-finger quartz" measured with $\text{Cu K}\alpha_1$ radiation on a STADI P in transmission mode with the linear PSD revealing a FWHM $0,07^\circ 2\theta$.

Typical applications of the linear PSD

The linear PSD is the detector of choice for all measurements requiring high resolution in reasonable time.

- On-line display during data collection (e.g. for alignment purposes)
- Symmetrical line profiles (e.g. for phase analysis and size/strain analysis)
- Excellent statistical accuracy (even from small amounts of sample)
- High resolution powder patterns (for Rietveld refinement or structure solution)

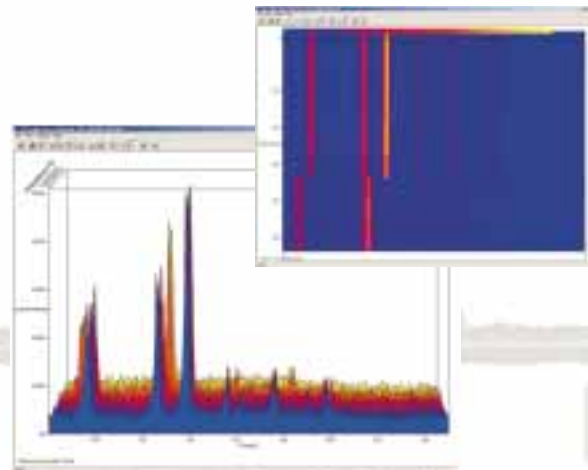
Fast data collection ...in combination with a high resolution that matches conventional PSDs has been in demand for a long time. Especially in phase transition studies normal detectors were characterized by long counting times or narrow angular ranges as well as poor intensities and counting statistics, all not suitable for Rietveld analysis.

STOE's IP-PSD STOE is the answer to these problems, offering an add-on detector using the high sensitivity and accuracy of the Imaging Plate technology. The STOE IP-PSD is an on-line system with a read out time of about 30 s for a full range of 140°.



STOE IP-PSD

The Imaging Plate technology allows short exposures times to give excellent counting statistics even for weak reflections. Placed either in a range between 0 - 140° or -70° and +70° on a STADI P diffractometer or on a Fixed Stage set-up, the detector is fully supported by STOE's WinX^{POW} software package. Combinations of the IP-PSD with STOE's high temperature stages, sample changer or various low temperature systems are an explicit idea of its use.



3D-graphic and simulated Guinier plot of the temperature depending phase transition of NH_4NO_3 measured with $\text{Mo K}\alpha_1$ -radiation on a fixed stage with a STOE furnace and the IP-PSD.

Typical applications of the IP-PSD

The Imaging Plate PSD should be used for all tasks in powder diffractometry where complete powder patterns have to be taken within minutes or even seconds.

- Qualitative phase analysis for high sample throughput (e.g. combined with a sample changer)
- Temperature resolved investigations of phase transitions
- Time resolved studies under ambient or non-ambient conditions (High/low temperature or pressure)

Specifications	Linear PSD	IP-PSD
Resolution	< 0.06° FWHM 2 θ	~0.1° FWHM 2 θ
Increments	0.005°	0.01°
Radius	-	140 mm
2 θ range	5 - 7° (distance dependent)	140°
Technique	Wire detector	Imaging plate
Pressure	5 - 6 bar	-
Weight	3 kg	7.5 kg
Geometries	Transmission, Debye-Scherrer, Bragg/Brentano, θ/θ	Transmission, Debye-Scherrer
Software	WinX ^{POW}	WinX ^{POW}



Typical setup of STOE's transmission diffractometer STADI P with linear PSD, transmission sample holder including the sample changer and the curved Ge(111) monochromator beneath its cover.



IP-PSD mounted on STOE's fixed stage with high temperature attachment and Video CCD microscope for capillary adjustment. An economical "workhorse" for a horizontal tube housing.