

For further extension of the analytical field —————

Application Attachments

X-ray Diffractometer Attachment Series

Rigaku offers a large variety of X-ray diffractometer attachments to expand and enrich the spheres of application analysis.

Keeping pace with state-of-the-art analytical techniques, Rigaku has continued to develop, improve and renew its application attachments to meet a wide range of analytical needs. Jointly with Rigaku basic X-ray systems, these sophisticated attachments and periphery devices serve for diversifying analytical works including R & D and quality control. Introduced is their latest lineup in large variety. Choose from among them what may best meet the purpose of your application.

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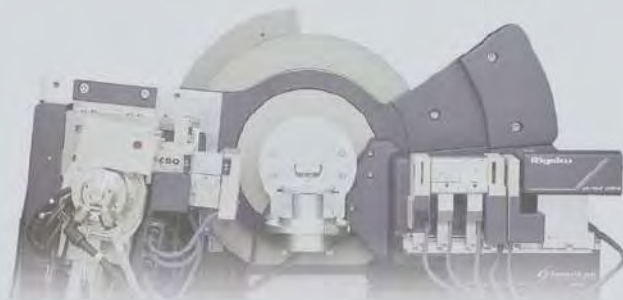
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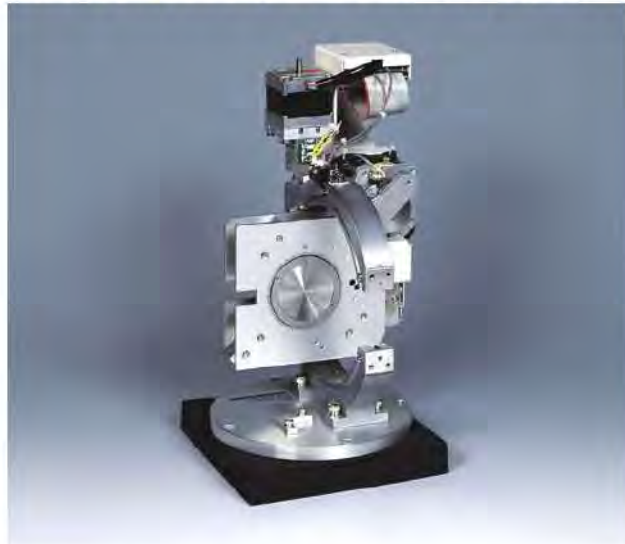
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Available attachments vary with diffractometer.
For additional information, please contact a sales representative.



Multipurpose Measurement Attachment MPA-2000

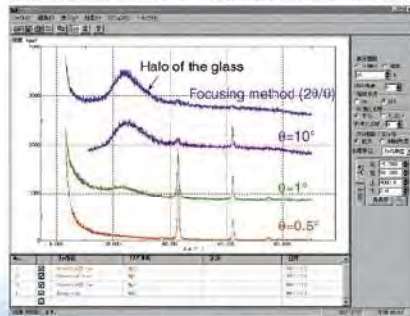


When the purpose of measurement includes different types of measurements, this has so far required plural attachments, each of which is to be dedicated to the specific measurement, respectively. The multipurpose attachment introduced here is so designed that it is equipped with four driving axes to enable pole figure, thin film and stress measurements with a single unit. This attachment is an epoch-making system as it makes unnecessary the troublesome exchange of attachments, thus saving costs, time and space.

- The attachment encompasses those functions performed by the pole figure attachment (reflection method, transmission method*, with γ oscillation), stress analysis attachment (iso-inclination method, side-inclination method), thin film attachment and specimen rotation attachment.
- Effective for low-angle incidence measurement and pole figure measurement of a thin film sample with the aid of an automatic sample back-and-forth positioning function (minimum translation: 1 μ m).
- Large, thick samples also are measurable (MPA-2000 max. dia. : 40 mm, max. thickness: 10 mm / MPA-IV max. dia. : 100 mm, max. thickness: 10 mm). Even 4 water can be mounted by use of a vacuum chuck available as an option.
- Optical axis alignment with respect to the sample plane is automatically carried out through the Ultima III, Ultima IV systems.

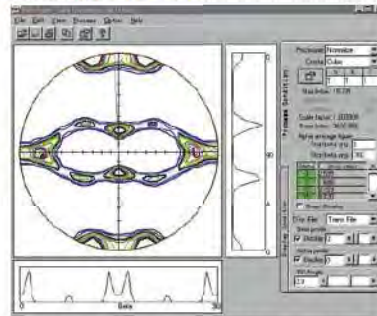
Measurement examples

MgO thin film on glass substrate (film thickness: 3000 \AA)



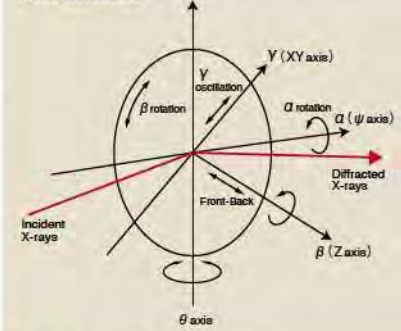
This measurement result indicates that the thin-film optical system resulted in a lower incidence angle and thereby reduced the intensity of halo caused by the substrate glass, thus raising the relative intensity of diffracted X-ray beam from the MgO film.

Pole figure of aluminum film Al (111)



By using the alpha and beta axes of the MPA-2000, pole figure measurement can be conducted for the evaluation of metal-sheet texture components such as rolled sheets.

Axial motion

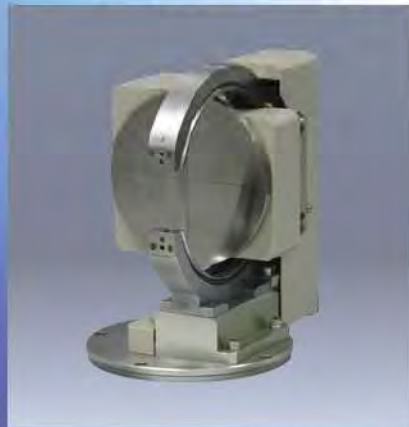


* Transmission method: $2\theta = 20^\circ \sim$

Specifications

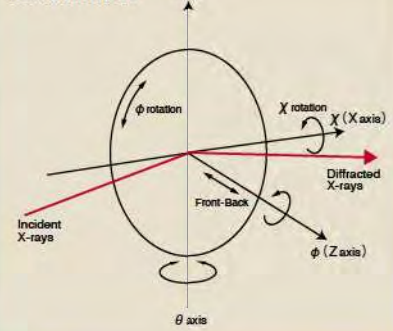
α -axis (Inclination)	Operation range: 15 to 120° Minimum step: 0.001°/step
β -axis (Intraplantar rotation)	Operation range: 360° Minimum step: 0.01°/step
Z-axis (front and rear)	Operation range: 10 mm Minimum step: 0.001 mm/step
Y-axis (reciprocal motion in 45° direction)	Operation range: ± 10 mm
Sample size	Max. 40 mm dia., 10 mm thick, 2" to 4" water (optional vacuum chuck needed)

Multipurpose Measurement Attachment MPA-IV



This sample spinner is designed exclusively for measurement based on the reflection method, such as pole figure measurement (reflection method only), residual stress measurement, thin-film measurement (grazing-incidence measurement), and reflectivity measurement.

Axial motion



Specifications

Rotating angle (ϕ -axis)	Operation range: -360° to $+360^\circ$ Minimum step: 0.005°
Tilt angle (χ -axis)	Operation range: -5° to $+92^\circ$ Minimum step: 0.002°
Sample height (Z-axis)	Operation range: -6 mm to +1 mm Minimum step: 0.00025 mm
Sample size	Max. 100 mm dia., 8 mm thick

High Temperature X-ray Diffractometer Attachment SHT-1500

2311B561



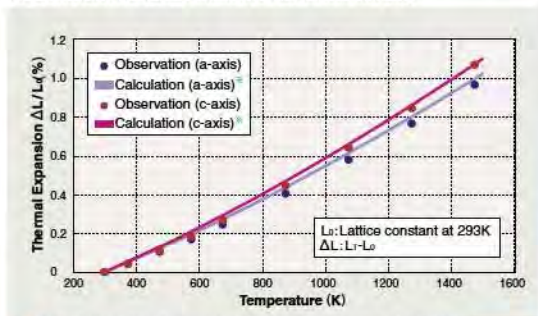
This attachment is designed to get information on crystal structure changes and changes of solubility (phase diagram) among various substances by heating a sample at high temperatures. The furnace design unique to Rigaku permits thin film and stress measurements. The airtight casing uses Al coated kapton foil to minimize X-ray attenuation. A moving mechanism equipped with a 5-phase stepping motor located in the peripheral area of the furnace allows movement of the sample holder to facilitate accurate setting via automatic control from the Ultima III, Ultima IV X-ray diffractometer systems.

Measurement Example

Temperature dependency of Al_2O_3 (Corundum) thermal expansion

Temperature (K)	Lattice constant (Å)	
	a axis	c axis
298	4.75916 (05)	12.99212 (18)
373	4.76111 (08)	12.99761 (29)
473	4.76410 (04)	13.00638 (17)
573	4.76734 (03)	13.01630 (13)
673	4.77098 (05)	13.02716 (20)
873	4.77854 (09)	13.05035 (35)
1073	4.78686 (07)	13.07556 (27)
1273	4.79571 (11)	13.10166 (96)
1473	4.80514 (11)	13.13095 (42)

(Parenthesis show the standard deviations for the 7 reflections of Al_2O_3)



※ Y.S. Touloukian, et al, Thermophysical properties of matter, 13, 176 (1977)

Specifications

Operating temp	Ambient to 1500°C in air Ambient to 1450°C in vacuum Ambient to 1300°C in inert gas (He)
Measuring angle range	$2\theta = 0$ to 158° (This range varies depending on a X-ray generator to be combined)
X-ray window	Al coated kapton foil. Insulation drum material (window): Ni
Sample heating system	Side heating system
Thermocouple	JIS R type (Pt-PtRh 13%) For temp. measurement: 0.2 mm dia. For control: 0.3 mm dia.
Sample size	Max. 13.5 mm × 25 mm, 0.5 mm thick

※ Cat.No.5188 programming temperature controller is required.

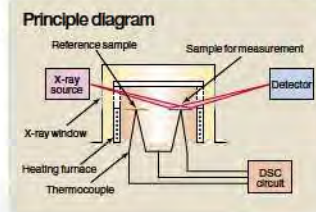
Simultaneous measurement system of X-ray diffractometry and Differential scanning calorimetry X-ray DSC

8230XM



Crystals keep on changing continuously at the time of transition, dehydration, fusion and solidification. The XRD-DSC system is capable of carrying out simultaneous measurement of both crystal changes and thermal changes.

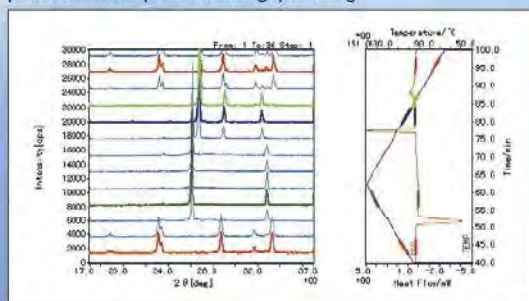
The system is highly effective for the evaluation of organic compounds, medicines, polymers, inorganic compounds, ceramics, electronic materials and so on. Since X-ray diffraction and differential scanning calorimetry measurements are performed under the same condition for the sample, temperature and measurement atmosphere, this leads to substantially upgraded reliability of the analysis outcome as well as efficiency in working on R & D and quality evaluation.



Measurement Example

Phase transition of potassium nitrate (KNO_3)

KNO_3 is known as a ferroelectric substance and also serves as a thermal standard sample in thermal analysis. In the heating process, this material changes from the orthorhombic system to the rhombohedral system at about $128^\circ C$, and in the cooling system, it returns to the orthorhombic system via the intermediate phase known to emerge only in the cooling process. The diagram shows KNO_3 measured in the heating and cooling process. In this way the XRD-DSC can easily measure the thermal and structural changes in the heating and cooling process of a sample not allowing quenching.

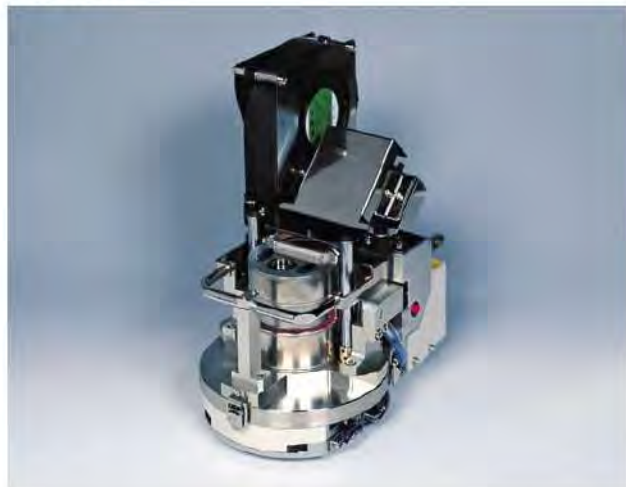


Specifications

X-ray diffractometer	Ultima III, Ultima IV
DSC section	Heat flow type DSC circuit and Thermo Plus 2 thermal analysis station
Sample container	Made of aluminum
Measurement temperature range	Ambient to 350°C (option: low temp measurement from -40°C)
Measurement atmosphere	Air, inert gas (option: Humid atmosphere measurement from ambient to 60°C, 20% to 90%RH by connecting to humidity generator HUM-1)
2θ measuring angle range	$2\theta = 5$ to 40°
Heating and cooling rate	0.5 to 10°C/min, temp. held constant (depending on how the measuring angle range and the fixed-rate auto speed are combined.)
Sample size	7 mm × 7 mm × 0.25 mm

Infrared Heating High temperature Attachment Reactor X

8450X102



Installed to a theta-theta goniometer or a vertical goniometer, this attachment is designed for X-ray diffraction measurement of a sample being heated. Employment of infrared heating system enables simulation of rapid heating and cooling. Further, since the heater section and the sample section are separated, this makes it possible to conduct measurement in various gas atmospheres. Accurate setting can be made easily by automatic control from the Ultima III, Ultima IV diffractometer systems.

Specifications

Operating temperature	Ambient to 1000 °C
Sample atmosphere	Air, Inert gas, etc. *
Measuring angle range	0 to 158° *
X-ray window	Metallic beryllium
Container material	SUS
Sample heating system	Infrared heating system
Thermocouple	JIS K type
Sample holder material	Made of quartz glass
Sample plate material	Made of quartz glass
Sample size	Max. 20 mm × 13 mm, 0.3 mm thick

* Consult Rigaku when the use of a special gas is wanted.
 ※ Cat.No.5188 programming temperature controller is required.

High Temperature Attachment with humidity control

8353X001



This attachment permits sample measurement in a humid atmosphere. Flowing of high-temperature vapor will not cause dew condensation. Three types are available according to the operating temperature and the purpose of measurement.

Specifications

Sample temp.	Ambient to 300 °C
Temp. and humidity range	Ambient to 60 °C 10 to 90 %RH
Sample atmosphere	Air, Inert gas, vacuum
Measuring angle range	2θ = 0 to 158° *
Thermocouple	For control and temp. Measurement JIS R type (Pt-PtRh13%)
X-ray window	Kapton film
Sample size	Max.20mm × 16mm, 0.3, 0.5mm thick

※ Programming temperature controller is required.
 ※ The high temp. type is available only for the Theta-theta goniometer.

Medium & Low Temperature X-ray Diffractometer Attachment

2352B101/2352B201/2352B401



For X-ray diffractometry in a low or medium temperature region. Heating or cooling can be made successively over a range between -180 and 300 °C (in vacuum). A liquid nitrogen continuous flow cooling method is employed.

Specifications

Operating temp.	In vacuum (1 Pa or less): -180 to 300 °C In air or inert gas: Ambient to 300 °C
Sample atmosphere	Air (for a minus temp. region, 1 Pa or less in vacuum)
Measuring angle range	2θ = 0 to 158° *
X-ray window	Al coated mylar
Thermocouple	For control: JIS K type (chromel-alumel) For temp. measurement: JIS K type (chromel-alumel)
Sample size	Max. 25 mm × 17 mm, 2 mm thick.

※ Cat.No.5188 programming temperature controller is required.

* The measuring angle range differs according to a X-ray generator to be combined.

Humidity Generator HUM-1 8353E301



All that is necessary for the operator is to set the aimed relative humidity. Stable humidity will then be obtainable by feedback control. This unit is suitable for the generation of humid gas of a relatively small flow rate, e.g. several hundred milliliters per minute. It offers an optimal tool for a thermal stability test and continuous measurement of humidity absorption and dehydration changes under a humid atmosphere.

Specifications

System	Diversion system (1 tank bubbling method). Feedback control of the flow rate of dry gas by means of thermal and humidity sensors located near a sample under measurement.
Temp. control range	Ambient to 80 °C : 20 %RH - 90 %RH
Thermal stability	Within ± 2 %RH (excepting the transient state at time of changing the setting)
Sustainable time	About 100 hours at approx. (60 °C, 90 %RH)
Gas required	Dry air or nitrogen, approx. 0.05 MPa, max. flow rate: Max. 500 mL/min, through pipe of 6 mm O.D.
External dimensions and weight	Approx. 300W x 350D x 300H mm, 16.6 kg

Programming Temperature Controller PTC-30A 5188F101



The PTC-30 is a versatile programming temperature controller. Provided with PID auto tuning mechanism, it permits temperature control of various types of high and low temperature X-ray diffractometers and copes with 10 kinds of thermocouples. Further, independent zero compensation is provided for two kinds of thermocouples for the sample and the furnace.

Specifications

Regulator	PID constants determination function by auto tuning
Function by auto tuning	R (PtRh13), PL, K (CA), PtRh5-20, B (PtRh6-30), WRe5-26, E (CRC), J (C), T (CC), PR (PtRh12-7), AuFe
Number of programs (number of steps)	0 to 9 patterns (0 to 58 steps)
Pattern control	Heating & Cooling speed, preset temp., hold time, number of times for repetition for sample
Power section	SCR control (analogue system)
Power consumption	100V AC ± 10 %, 15A

Fiber Specimen Attachment 2412F601



Mounted on a wide angle goniometer, this attachment is designed for elongation of a fiber sample to measure changes in the crystalline structure and to evaluate the state of preferred orientation. Measurement can be made on the equatorial plane, the meridian plane as well as the optional orientation angle.

Specifications

Sample rotation	In meridian direction with stepping motor
Optical system	Parallel beam method

Automatic sample changer for 6 samples (ASC-6B)



This sample changer allows continuous measurement of up to six samples. It can also be used for thin-film measurement.

Specifications

Number of samples	Max. 6 samples
Sample rotation speed	Max. 120 rpm, rotation speed can be set via computer
Angle measurement range	$2\theta = 0$ to 158° ★
Sample size	Max. 24 mm diameter and 2 mm thickness

Automatic sample changer for 120 samples (ASC-120)

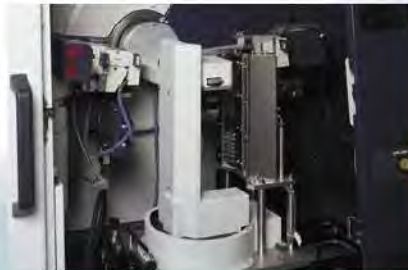


This sample changer can be mounted with up to 120 samples. Featuring a sample spinning function, this unit is designed to accommodate samples with coarse crystal grains and samples with a preferred orientation.

Specifications

Number of samples	Max. 120 samples
Angle measurement range	$2\theta = 3.2$ to 162° ★ (effective angle at center of sample)
Sample rotation speed	60 to 120 rpm
Magazine	Max. 5 sets (Each magazine can accommodate up to 24 sample plates measuring 35 mm in width, 50 mm in height, and 2 mm in thickness.)
Sample plate	Glass sample plate with depth of 0.5 mm (option: glass sample plate with depth of 0.2 mm)

Automatic Sample Changer for 48 Samples (ASC-48)



This sample changer can be mounted with up to 48 samples. Featuring a sample spinning function, this unit is designed to accommodate samples with coarse crystal grains and samples with a preferred orientation.

Specifications

Number of samples	Max. 48 samples
Angle measurement range	$2\theta = 3.2$ to 162° ★ (effective angle at center of sample)
Sample rotation speed	60 to 120 rpm
Magazine	Max. 2 sets (Each magazine can accommodate up to 24 sample plates measuring 35 mm in width, 50 mm in height, and 2 mm in thickness.)
Sample plate	Glass sample plate with depth of 0.5 mm (option: glass sample plate with depth of 0.2 mm)

Automatic Sample Changer for 10 Samples (ASC-10) 2455E412



Ten samples can be loaded for continuous measurement. Thin film measurement also is possible.

Specifications

Number of samples	10 in maximum
Sample rotation speed	Max. 120 rpm *
Measuring angle range	$2\theta = 0$ to 158° *
Sample size	Max. 24 mm dia., 2 mm thick

* The rotation speed can be set via computer.

Sample Rotation Attachment 2701C301/2701G101



This attachment is designed to remove the effect of coarse crystal grains by planar rotation of the sample, thereby increasing the number of crystallites that contribute to an apparent diffraction pattern.

Specifications

Measurement method	Reflection method
Sample rotation speed	60 to 120 rpm *
Measuring angle range	$2\theta = 3.2$ to 158° *

* The rotation speed can be set via computer.

Sample Rotation (with Z-axis) Attachment 2701E201/2701H101



This attachment is used specifically for thin film sample measurement. A sample back-and-forth moving mechanism is provided allowing low angle incidence with the θ -axis fixed.

Specifications

Sample rotation speed	60 to 120 rpm *
Back-and-forth mechanism for sample	-5 mm to 2 mm
Measuring angle range	$2\theta = 0$ to 158° *

* The rotation speed can be set via computer.

Capillary Rotation Attachment 2703B311/2703B312/2703D101



With such a sample as a needle-shape or plate-shape crystal filled in a capillary tube, this attachment is designed for measurement while rotating the sample. So the effect of preferred orientation can be reduced.

Specifications

Rotation speed	60 to 120 rpm *
Vibration due to rotation	Within 0.2 mm dia.
Capillary fitting-in size	0.8 to 2.0 mm

* The rotation speed can be set via computer.

Airtight sample holder



This sample holder is designed to handle samples that react with air (oxygen, moisture vapor, etc.), enabling measurement under a controlled environment such as an inert gas environment.

Specifications

Environment	Vacuum or Inert gas Equipped with stop valve
Angle measurement range	$2\theta = 0$ to 158° *
X-ray window	Metal beryllium
Sample size	Max. 20 mm x 18 mm, thickness: 1.5 mm

Electrode cell attachment



This attachment is used for the measurement of samples containing an electrolyte used for batteries. It enables x-ray diffractometry while controlling the voltage generated by the electrolyte.

Specifications

Material	Stainless, Teflon
Number of poles	2 poles
Electrolyte inlet	1 inlet
Angle measurement range	$2\theta = 10$ to 158° *
Sample size	20 mm diameter

* The measuring angle range differs according to a X-ray generator to be combined.

Detectors

Versatile high-sensitivity IP reader RAXIA-Di



This versatile high-sensitivity IP reader is used in combination with an IP cassette. It adapts to various optical systems including those utilizing the Laue method, small angle scattering method, and fiber sample measurement method (preferred orientation, crystallinity). This IP reader can be used simply by adding an IP cassette mount mechanism to your existing optical system. The inner surface reading system assures uniform, high-precision reading without requiring correction of intensity. Using the software, the resolution (pixel size: 50 μm , 100 μm) and IP size (max. 356 \times 432 mm) can be selected to suit the purpose at hand.

※ IP: Imaging plate

Specifications

Reading size	127 \times 127 mm, 201 \times 252 mm, 252 \times 303 mm, etc. Max. size: 356 \times 432 mm
Reading time	2000 lines/min For 127 \times 127 mm: Approx. 40 sec. (when reading at 100 μm) Approx. 80 sec. (when reading at 50 μm) For 201 \times 252 mm: Approx. 75 sec. (when reading at 100 μm) Approx. 150 sec. (when reading at 50 μm) For 356 \times 432 mm: Approx. 130 sec. (when reading at 100 μm) Approx. 260 sec. (when reading at 50 μm)
Dynamic range	Approx. 2×10^6
Sensitivity	1 count/photon or better
Interface	USB 2.0

High-speed Detector D/teX Ultra



The D/teX Ultra makes it practical to obtain the XRD intensities several ten times higher than with the scintillation counter, so even by rapid scanning it permits collection of data sufficient for analysis. A drastic reduction in measurement time makes this detector very effective for measurement at high and low temperatures as well as in different sorts of atmosphere. Since, moreover, diffracted rays are obtained one-dimensionally, the sample's preferred orientation, grain size, state of adjustment and the like can be visually checked. The D/teX Ultra is an epoch-making X-ray detector.

Specifications

Max. scan speed	100°/min
Data obtained	One-dimensional pattern
Detector element	Semiconductor element
Utility	Power supply only (from the basic X-ray unit)
Compatible system	Ultima IV

High-speed two-dimensional X-ray detector PILATUS 100K/R



This two-dimensional X-ray detector has a detection area of approximately 40 \times 80 mm, and boasts low noise — less than 1/1000 the noise level of the previous model — and a high data reading speed approximately 1,000 times faster than our standard CCD detector. This detector can be used for various applications, including time-sharing measurement during phase transition of a sample. In addition, it features TDI mode, which enables measurement with a virtually expanded detection area.

Specifications

Max. scanning speed	100°/min (2 θ / θ scan)
Detection element	Two-dimensional hybrid detection element
Compatible equipment	SmartLab, NANO-Viewer

Sample Holders

Al Sample Holder 2100A101



Non Reflective Sample Holder of Si 9202A101



Sample Holder for Block Sample 2101A1



Glass Sample Holder 0.2mm depth 9200/2G



Glass Sample Holder 0.5mm depth 9200/5G



Sample Plate for Platinum (Shape of a shelf)



Sample Plate for Platinum (Flat surface)



Sample Holder for ASC perforated 2455E441



Sample Holder for ASC 0.2mm depth 2455E444



Sample Holder for ASC 2mm depth 2455E442



Sample Holder for ASC 0.5mm depth 2455E445



Non-ambient XRD attachments

▶ **DHS 1100**

For direct sample heating to 1100 °C on four-circle goniometers

▶ **DHS 900**

For direct sample heating to 900 °C on four-circle goniometers

▶ **DCS 350**

For XRD studies on four-circle goniometers in the temperature range of -100 °C to 350 °C

▶ **HTK1200N**

For XRD studies with environmental heating to 1200 °C

▶ **HTK 1200N Capillary Extension**

For non-ambient X-ray diffraction studies in capillaries up to 1000 °C

▶ **HTK 16 | HTK 2000**

For direct sample heating up to 1600 °C | 2300 °C

▶ **XRK 900**

For XRD measurements of solid state and solid state-gas reactions up to 900 °C and 10 bar

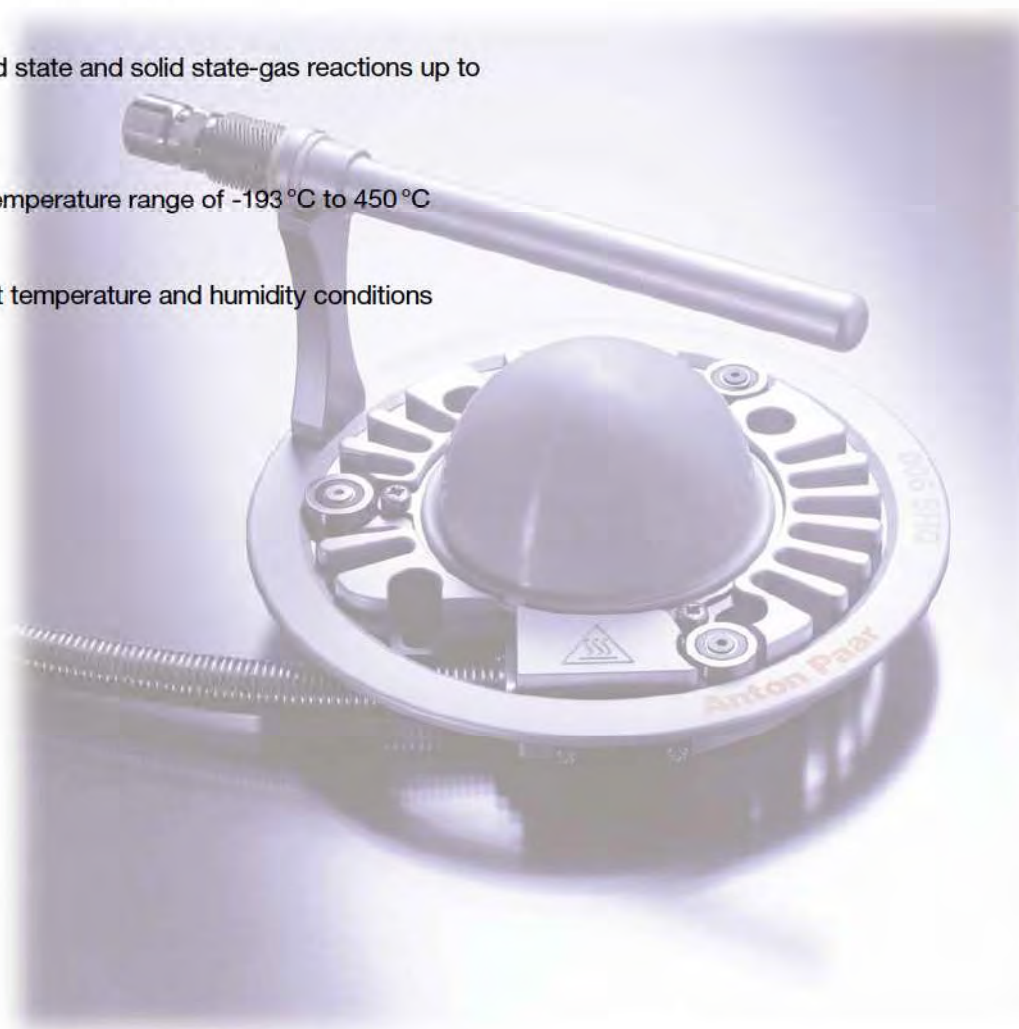
▶ **TTK450**

For XRD investigations in the temperature range of -193 °C to 450 °C

▶ **CHC**

For XRD studies under different temperature and humidity conditions

Products of Anton Paar



A Unique Heating Attachment
for Four-Circle Goniometers

DHS 1100



The DHS 1100 is an advanced heating attachment for in-situ diffraction studies on four-circle goniometers up to 1100 °C. It fits to all common four-circle goniometers instead of the standard sample holder. The unique dome-shaped X-ray window made of graphite allows to analyze samples under vacuum and under inert gas to avoid oxidation or other chemical reactions of the sample at high temperatures.

Technical Data

Temp. range	Ambient to 1100 °C
Temp. control	TCU 200 Temperature Control Unit
Atmospheres	Air, inert gas, vacuum

Low-Temperature Attachment for
Four-circle Goniometers and XYZ Stages

DCS 350



The DCS 350 is a novel attachment for in-situ X-ray diffraction studies between -100 °C and 350 °C on four-circle goniometers and XYZ stages. The clever design of the instrument provides for a high temperature uniformity and good position stability of the sample over the whole temperature range.

The combination of a liquid nitrogen flow control unit and a temperature control unit guarantees short cooling and heating cycles. High-precision temperature measurement is performed in the sample holder.

Technical Data

Temp. range	-100 °C to 350 °C
Temp. control	TCU 100 Temperature Control Unit
Atmospheres	Vacuum, air, inert gas

Environmental Heating for
Homogeneous Sample Temperature

HTK 1200N | HTK1200N Capillary



The HTK 1200N has been the attachment of choice for in-situ XRD studies on flat samples up to 1200 °C for many years. The novel capillary extension turns this well-known oven-chamber into a powerful capillary heater.

Due to its environmental heater, there is virtually no temperature gradient in the sample, even in samples of up to 5 mm thickness.

The sample spinning option provides highly random grain orientation, which is necessary for good diffraction data quality and subsequent profile fitting routines.

Technical Data

Temp. range	Ambient to 1200 °C
Temp. control	TCU 1000N Temperature Control Unit
Atmospheres	Various gases, vacuum

Filament Heating
up to 2300 °C

HTK 16 | HTK 2000



The HTK 16 and HTK 2000 high-temperature chambers are used for X-ray studies with direct sample heating. Investigations can be carried out in vacuum or various gases depending on the experiment and the used heating filament (Pt, Ta, W, C or others on request). The new graphite heating filament with inert sample support platelets offers the advantages of a better temperature homogeneity in the sample and a higher chemical resistance.

Technical Data

Temp. range	Ambient to 1600 °C (HTK 16) Ambient to 2300 °C (HTK 2000)
Temp. control	TCU 2000 Temperature Control Unit (HTK 16) TCU 2000/20 Temperature Control Unit (HTK 2000)
Atmospheres	Vacuum, air up to 1600 °C for HTK 16 HTK 2000 Vacuum up to 2300 °C for HTK 2000

In-situ XRD Investigations of Solid State Reactions

XRK 900



The XRK 900 is the only reactor chamber for X-ray diffraction experiments on the market. Its robust and sophisticated design allows to perform studies of solid state and solid state-gas reactions from room temperature to 900 °C.

For solid state-gas reactions defined atmospheric conditions are an important precondition. The design permits homogeneous flushing with reaction gas and gas flow through the sample. The housing can be heated up to 150 °C to prevent condensation of reaction products.

Technical Data

Temp. range	Ambient to 900 °C
Temp. control	TCU 750 Temperature Control Unit
Atmospheres	Vacuum, air, inert gas, reaction gases from 1 mbar to 10 bar

Low-Temperature XRD Studies between -193 °C and 450 °C

TTK 450



The TTK 450 Low-Temperature Chamber is designed for X-ray diffraction studies in the temperature range from -193 °C to 450 °C. Tests may be carried out either under vacuum, air or inert gas.

For work at low temperatures liquid nitrogen is transferred by insulated hoses from a dewar to the chamber. The hoses are connected with a specially designed two-pipe ball connector which can be turned by approx. 180°, even if the apparatus is frozen.

Technical Data

Temp. range	-193 °C to 450 °C
Temp. control	TCU 100 Temperature Control Unit
Atmospheres	Vacuum, air, inert gas

Studies Under Controlled Temperature and Relative Humidity Conditions

CHC



With the CHC Cryo & Humidity Chamber the effects of temperature and relative humidity (RH) on materials can be studied with X-ray diffraction experiments.

The housing of the CHC and the transfer hoses for the humid gas are heated above sample temperature by a circulating water bath, to prevent any condensation inside the system.

Technical Data

RH range	2% to 95%
Temp. range	-5 to 400 °C
Temp. control	TCU 110 Temperature Control Unit
Atmospheres	Vacuum, air, inert gas





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