

DOCUMENTATION DE LA CHAMBRE À CRISTAL TOURNANT DE HILGER ET WATTS, UNICAM S 25

FICHE N° 4027

PRÉSERVER
SAUVEGARDER
VALORISER

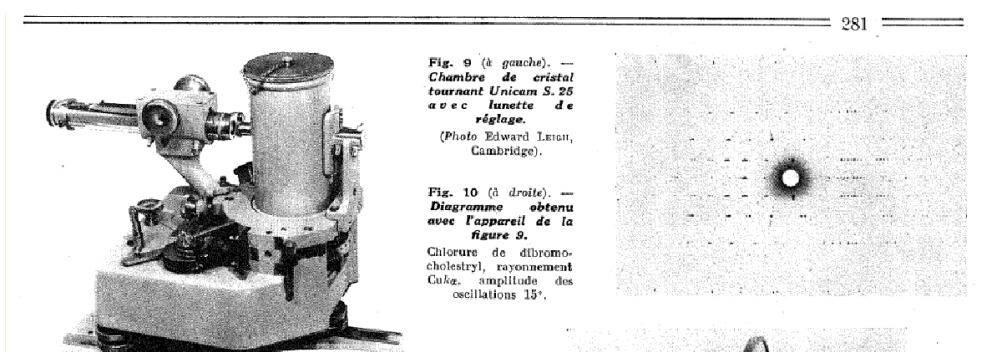
Période de fabrication : 1950-1974
Fabricant : Hilger and Watts
Domaines : Chimie, Physique
Sous-domaines : Cristallographie, Cristallographie
Organisme : Université de Rennes
Ville : Rennes
Modèle : S 25
Matériaux : Papier

Description

La chambre de diffraction de rayons X pour cristal tournant encore appelée en anglais « single cristal goniometer » a été fabriquée par la société UNICAM Instruments à Cambridge vers 1961. Dénommée aussi chambre de Hilger et Watts, elle était vendue avec une importante documentation en anglais. Un premier livret de huit pages édité en 1961 présente l'appareil et ses accessoires ainsi que les manipulations à réaliser. Un second de six pages détaille les instructions et les opérations.

Utilisation

Cette chambre de diffraction de rayons X, permettait de faire de nombreuses expériences sur des cristaux comme un goniomètre classique telles que réflexion et transmission du rayonnement, lumière polarisée... Elle servait aussi en cristallographie pour la méthode expérimentale dite du « cristal tournant » : oscillation de cristal, diagramme de Laue. On pouvait ainsi déterminer les paramètres cristallographiques d'un cristal inconnu lorsque ses axes cristallographiques sont successivement pris comme axe de rotation. Les tâches de diffraction enregistrées sur une plaque photo se présentent sous forme de strates linéaires.



H. Rouleau

OPERATING • MAINTENANCE AND SERVICE MANUAL

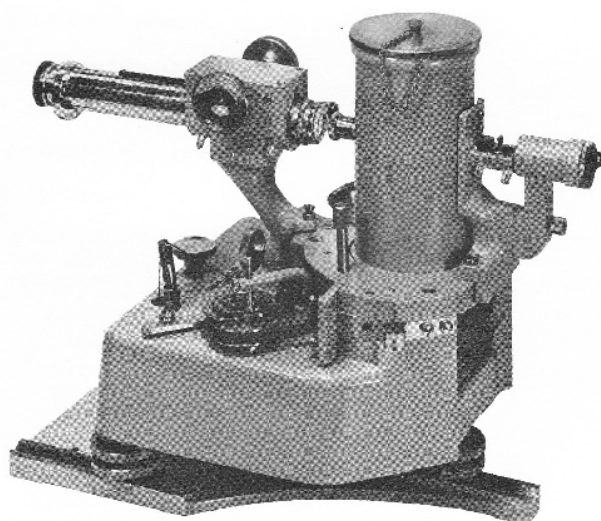
S. 25
Single Crystal
Goniometer

UNICAM

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S.25 Single Crystal Goniometer

Operating Instructions



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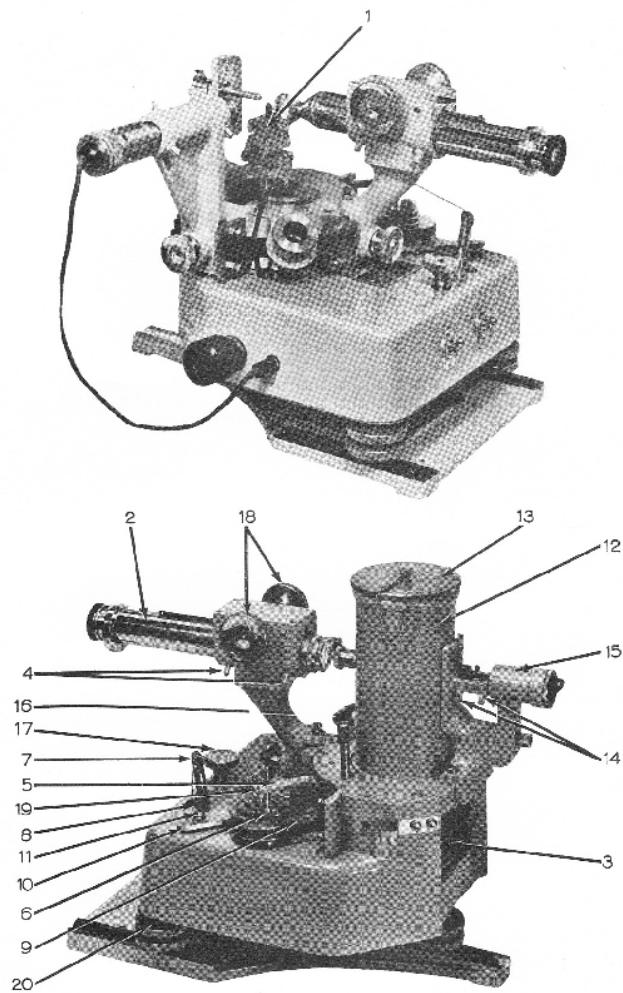


Fig.1 S.25 Single Crystal Goniometer

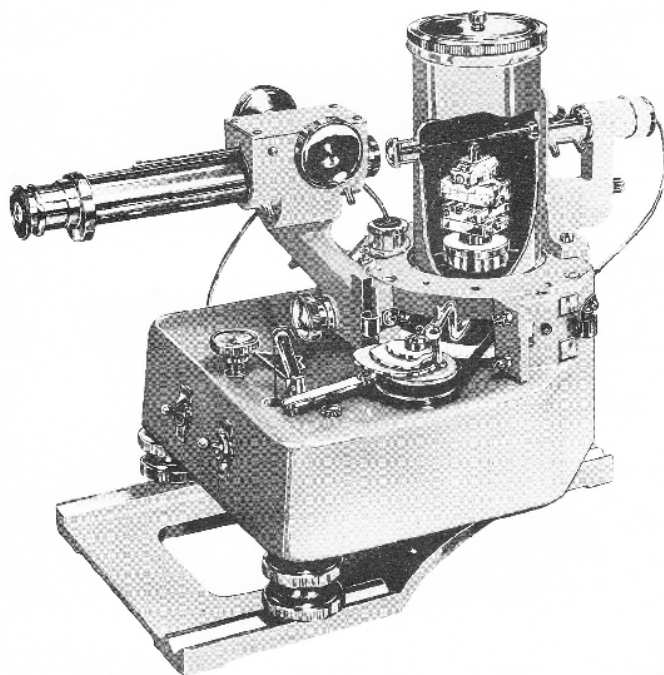
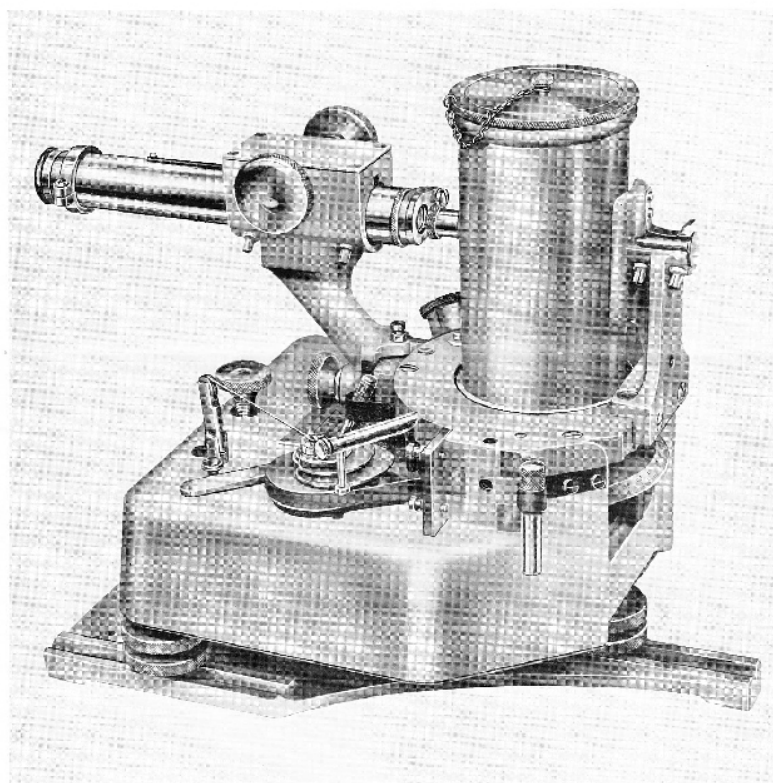


Fig.2. Cut-away View Showing Location of Arcs and Collimator

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S.25

SINGLE CRYSTAL GONIOMETER



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FLAT PLATE CAMERAS

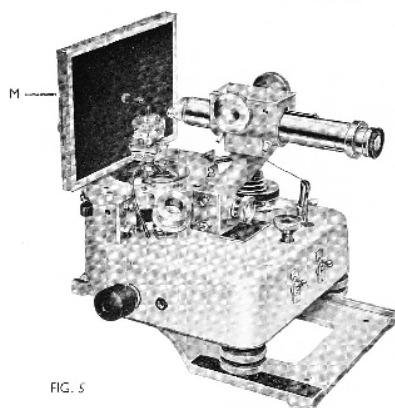


FIG. 5

1. TRANSMISSION OR SIDE-REFLECTION (S.26)

The flat plate camera K (Fig. 3) takes a film or plate, $3\frac{1}{2}'' \times 4\frac{1}{2}''$, which is mounted behind black paper and pressed against a frame adjusted to be accurately perpendicular to the X-ray beam. The frame of the camera is carried in a slide L and it may be set at any distance from the crystal between 40 mm. and 100 mm. The slide is screwed on to the base in place of the tele-microscope and may therefore be set either parallel or perpendicular to the X-ray beam. In the second position a side-reflection photograph would be obtained. Such a camera is almost essential in the study of the symmetry of crystals because only on a flat plate may the presence of the axes and planes of symmetry be recognised easily. It also has great value for taking oscillation photographs when a large crystal to film distance is necessary and only the part of the record near the centre is of interest.

2. BACK REFLECTION CAMERA (S.31)

The back reflection camera M (Fig. 5) takes a flat film $6\frac{1}{2}'' \times 4\frac{3}{4}''$ which must be punched so as to make it possible to pass the X-ray collimators through it. The frame of the camera is mounted in a special support which replaces the usual collimator holder. The crystal to film distance is 30 mm. This camera is invaluable when a reflection is required at normal incidence from a thick crystal specimen. It may be used for the study of crystallographic orientation or symmetry when the transmission method cannot be employed owing to the absorption of the specimen. It may also be used for the study of metal blocks which are so large that only a back reflection method is applicable.

3. RADIAL CAMERAS 5.73 cm. and 11.46 cm. (S.26A and B)

These cameras N, O (Figs. 6 and 7) are hemi-cylindrical and take films size 17.5×12.4 cm. Special punches are required to make the exit apertures in the correct position in each film. These cameras are mounted in the same way as the tele-microscope. Light tight end-pieces are provided to prevent fogging. These cameras are useful when only the X-rays scattered forwards and sideways are of interest and when the spots occur too close together on a camera of radius 30.0 mm. Such cameras therefore have special application to many biological crystals and others having large cell dimensions.

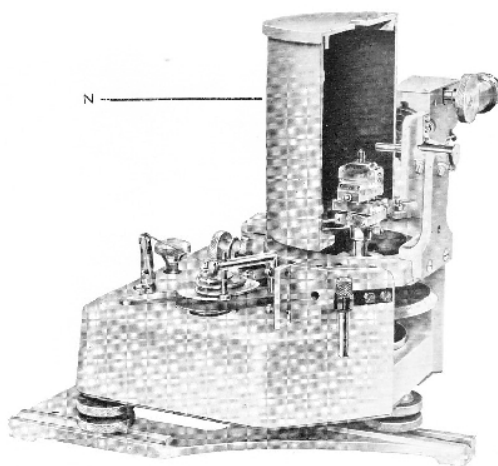


FIG. 6

4. OPTICAL COLLIMATOR (S.27)

An optical collimator O (Fig. 1) provided with its own lamp, which is fed with current from the transformer in the base of the instrument, can be mounted in any one of the positions normally occupied by the tele-microscope. The axis of the collimator may therefore be set in a position either perpendicular to the axis of the telescope or parallel to it. In the former arrangement (see Fig. 1) the whole instrument constitutes a single circle optical goniometer and can be used for morphological studies of crystals, or for orientating a specimen prior to taking an X-ray photograph. In the arrangement with the axes of the collimator and telescope parallel to one another any observations in polarised light which might be required can be made with the addition of polaroids.

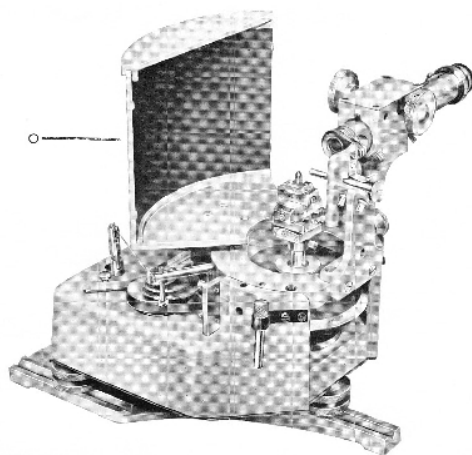


FIG. 7

5. POLARISING ATTACHMENT (S.27A)

A special accessory designed by Dr. M. F. Perutz is also available for observations in polarised light. This provides the means for the orientation of single crystals optically and is particularly useful for crystals having poorly developed edges and faces.

6. FILM PUNCHES (S.28)

A film punch is necessary for all cameras except the flat-plate camera (S.26). A hole must be punched accurately in the film to locate it in the camera and also to allow the passage of the direct X-ray beam. A short metal tube is pressed into the hole in the film and into a corresponding hole in the camera. A flange on the tube prevents fogging by either stray light or X-rays at the point of entry. The punches carry locating pegs to position the film accurately for the appropriate camera and operation is very simple.

7. TWEEZERS (S.29)

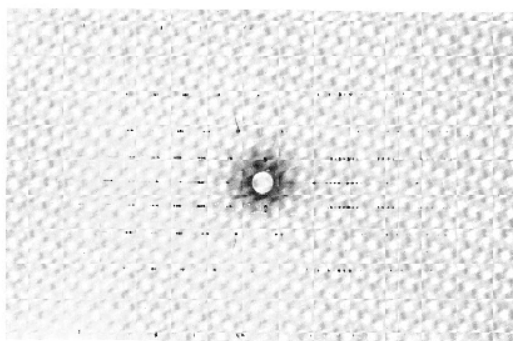
Cameras of diameter 60 mm. and less are too small to load conveniently without tweezers. A scissor-like instrument consisting of two pieces of brass pivoted about their centre and fitted with accurately designed end-pieces makes camera loading a comparatively simple operation with a little experience.

The fullest possible instructions are included in the operating manual supplied with each instrument.

SPECIMEN PHOTOGRAPHS

(a) Oscillation Photograph

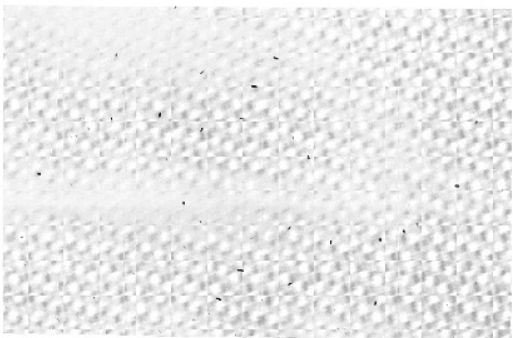
This is an oscillation photograph of dibromo cholesterol chloride taken with copper characteristic radiation. The angle of oscillation was 15° . The photograph shows well developed layer lines and the characteristic appearance obtained when the X-rays travel parallel, or nearly parallel, to a long crystallographic axis. The readily adjustable goniometer head makes it easy to obtain straight layer lines.



(a)

(b) Laue Photograph

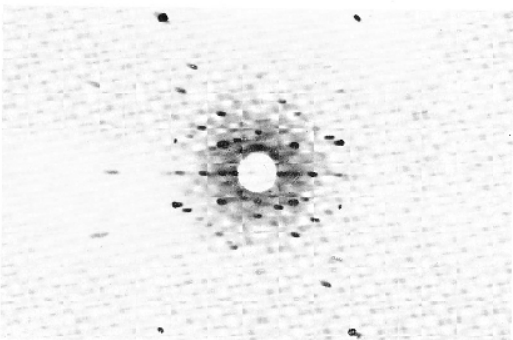
This is a Laue photograph of gypsum taken with the X-rays traveling parallel to a two fold axis. The characteristic ellipses arranged with this symmetry may easily be seen. The sharpness of the spots indicates the good collimation of the X-ray beam and the perfection of the crystal. The divided circle of the goniometer as well as the adjustable goniometer head are essential for obtaining a photograph showing the exact symmetry of the crystal.



(b)

(c) Back-reflection Laue Photograph

This is a back reflection Laue photograph of quartz. An X-cut oscillator plate was set normal to the X-ray beam and the photograph shows a two-fold axis almost coinciding with the direction of the beam. Such a photograph can readily be used for checking the accuracy with which such an oscillator plate has been cut.



(c)

Charts for the interpretation of X-ray photographs

Bernal charts for a cylindrical camera of 30.0 mm. radius are available printed on transparent paper. These give s , λ values by super-position on the photograph. A chart, also giving s , λ values, but suitable for a flat plate or film placed 4 cm. from the crystal in the direction of the direct beam is also available.

UNICAM INSTRUMENTS

SINGLE CRYSTAL GONIOMETER

Instrument and Accessories

SPECIFICATION

CATALOGUE NUMBERS

S.25	Single Crystal Goniometer (normally fitted for 200/240 v. 50 c/s. but available on request for other voltages and frequencies), complete with tele-microscope, 6 cm. diameter cylindrical camera and two X-ray collimators, $\frac{1}{2}$ and $\frac{1}{4}$ mm. apertures.		
S.26	Plate Camera.	S.28B	Film Punch for S.26B Radial Camera.
S.26A	5.73 cm. radius Radial Camera.	S.28C	Film Punch for S.31 Back Reflection Camera.
S.26B	11.46 cm. radius Radial Camera.		
S.27	Optical Collimator.	S.29	Tweezers.
S.27A	Perutz Polarising Attachment.	S.30	Monochromator for X-rays.
S.28	Film Punch for S.25 Cylindrical Camera.	S.31	Back Reflection Camera.
		S.33	Base and Rails for S.25 Goniometer.
S.28A	Film Punch for S.26A Radial Camera.	S.34	Spare interchangeable Goniometer Head.

OVERALL DIMENSIONS

Length 14.5" (37 cm.); Width 8" (20.1 cm.); Height 11.5" (29.21 cm.); Weight 27 lb. (13 kilos);

Minimum height of beam centre line from table 7.75" (19.68 cm.).

Finish : Light pearl grey glossy enamel and bright nickel.

WHEN ORDERING :

- (1) Please quote catalogue numbers.
- (2) Please give voltage and frequency of mains supply.

Full quotations will be sent by return.

As a result of design improvement, current production models may differ in minor detail from this description.

Price List on request

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Telephone : Cambridge 55227

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Pour nous citer :

Base de la Mission nationale de sauvegarde et de valorisation du patrimoine scientifique et technique contemporain, PATSTEC, Documentation de la chambre à cristal tournant de Hilger et Watts, UNICAM S 25 (Hilger and Watts),
<https://www.patstec.fr/ressources/objets/detail?id=16045>, consulté le 2026-07-28