

## X-Ray Energy Detector U10600

### Instruction manual

03/10 ALF



- 1 Entry window
- 2 Detector housing
- 3 Detector holder
- 4 USB port

### 1. Description

The X-ray energy detector allows for the energy spectra of X-ray or gamma-ray radiation in an energy range of between about 2 keV and 60 keV to be recorded.

The X-ray energy detector consists of an Si PIN photodiode built into a metal housing also containing a charge-sensitive pre-amp, a linear master amplifier with pulse shaping and a circuit with a digital signal processor. Power is supplied via a USB port on a PC. Measurement and evaluation of data is handled by the MCA Lab software running under Windows.

The holder for the detector is particularly suited for insertion into the goniometer arm (jib) of X-ray apparatus (U192001 and U192001-US).

### 2. Scope of delivery

- 1 X-ray energy detector
- 1 Detector holder
- 1 CD with software for measurement and evaluation
- 1 Instruction manual

### 3. Probability of detection

The probability of an Si PIN Photodiode detecting an X-ray photon depends on its energy  $E$ . At higher energies the probability becomes increasingly less.

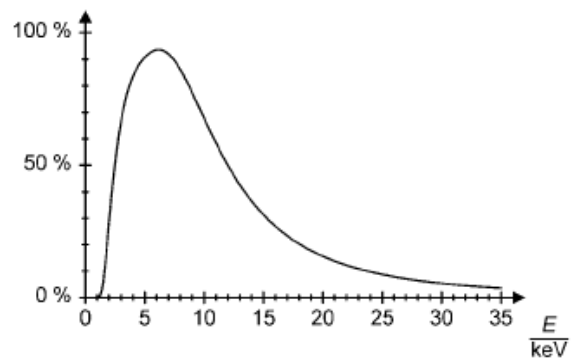


Fig. 1 Probability of detecting X-ray photons

#### 4. Technical data

Energy range:	2 keV to 60 keV approx.
Energy resolution:	0.55 keV (median width) at $E_{\text{FeK}\alpha} = 6.40 \text{ keV}$
Entry window:	Plastic (absorption equivalent to graphite of thickness $d = 40 \mu\text{m}$ )
Detector:	Si PIN photodiode
Active surface of detector:	0.8 mm diameter
Thickness of detector:	200 $\mu\text{m}$ approx.
Dead time (lag) per pulse:	200 $\mu\text{s}$ approx.
Length of cable:	1.75 m
Connection:	via USB
Dimensions of detector housing:	80 mm $\times$ 22 mm diam.
Weight:	150 g

#### System requirements for MCALab software

Operating system:	Windows 95 or later, Pentium processor of > 200 MHz recom- mended
Monitor resolution:	1024 $\times$ 768 pixels or higher recommended
For recording spectra:	Sound card with "Line In" input

#### 6. Operation

##### 5.1 Installation of MCALab software

- Install the software for the X-ray energy detector do not yet connect the detector to the PC.
- Place the CD into the appropriate PC drive.
- Run setup\_.exe and follow the instructions given by the install wizard.

The installation program allows you to choose between two installation options. 1. Full version: installs both the MCALab software and the hardware drivers for the X-ray energy detector.

2. Compact: installs the MCALab software only. In this case, the hardware drivers are copied to the \Drivers sub-folder, so that they can be installed manually at a later date.

In most cases, it is recommended that the full version be installed, since it reduces the number of steps required to work with the X-ray detector itself to a minimum.

Automatic installation of the drivers is the final step in the installation of the full version. The X-ray energy detector does not need to be connected to a PC. For some system configurations, it is impossible to install drivers automatically. If this is the case, they need to be installed manually.

- Connect the X-ray energy detector to a USB port of a PC.
- When the message "New hardware detected" appears, install the drivers from the folder {path for installation}\Drivers\CDM 2.06.00 WHQL Certified\ftdibus.inf.

A detailed description of how to install the drivers can be found in the \Drivers folder in the form of a PDF file.

##### 5.2 Assembly of X-ray energy detector into X-ray apparatus (U192001)

- Insert the X-ray energy detector into the magazine of the goniometer arm at the desired distance (see Fig. 2).
- Connect the X-ray energy detector to a USB port of the PC.
- Make sure the cable is connected in such a way that the goniometer arm can pivot to its full extent.

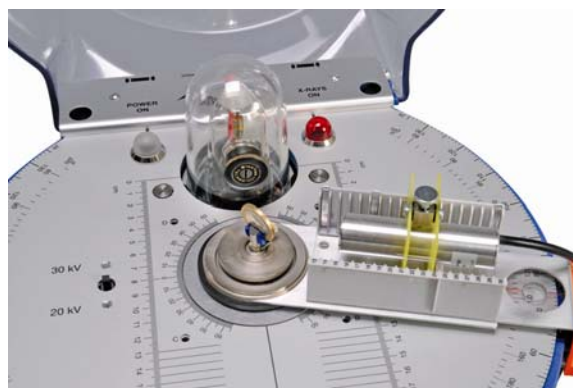


Fig. 2 Inserting the X-ray energy detector into the goniometer arm of the X-ray apparatus (U192001)

##### 5.3 Example experiment: X-ray fluorescence spectrum of a coin

- Insert the slotted collimator (from basic set U19205) onto the brass collimator of the lead-glass dome of the X-ray apparatus.
- Clamp the coin into the sample holder of the X-ray apparatus at an angle of about 55°.
- Insert the X-ray energy detector into the magazine on the goniometer arm and connect it to a PC.
- Move the goniometer arm to a 75° angle.
- Run the MCALab software, turn on the X-ray apparatus and carry out the measurement and evaluation.

A detailed description of the functions available in the software can be found in its help folder.

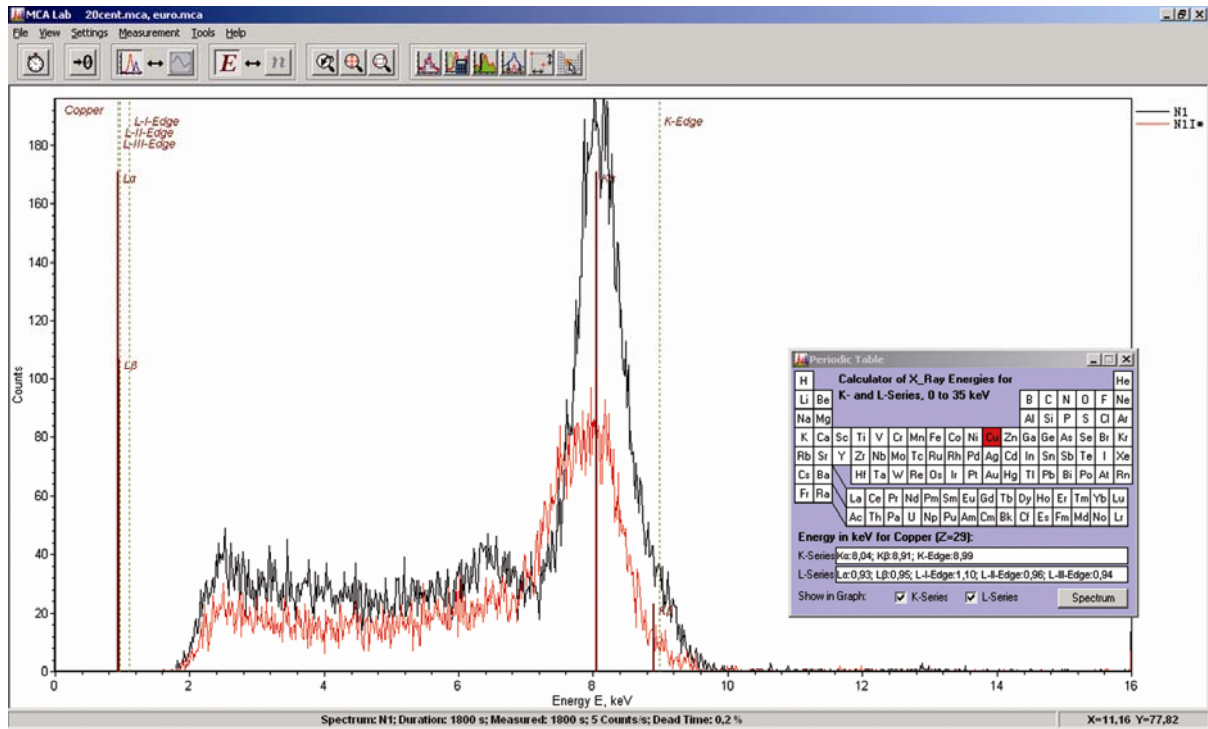


Fig. 3 Comparison of X-ray fluorescence spectra for two different coins

