



Battery Sample Holders for TTK 600

The battery sample holders for TTK 600 are the first commercial non-ambient stages for in-situ and in-operando XRD studies on batteries. Their unique design allows the batteries to be easily assembled within a glove box, followed by the transport of the battery to the measuring device within the gastight compartment of the sample holder.

The smart innovation for battery research!

New possibilities for battery research

In-operando XRD investigations on batteries have generated a lot of interest in recent years. This strong interest is based on the fact that the influence of the electrical load on the active materials of the battery can now be directly observed in investigations.

So far, these types of analyses with laboratory diffractometers have only been possible under ambient conditions. However, with the progress in e-mobility it is becoming more important to also obtain this type of information under non-ambient conditions. With such advanced technology, it is now possible to analyze the influence of different climate conditions on the battery performance.

The perfect commercial solution

The battery sample holders for TTK 600 are the first commercial non-ambient stages for in-situ and in-operando XRD studies on coin cells. Measurements can be performed between -180 °C and 130 °C.

Two types of sample holders are available: one is used for measurements in reflection geometry; the other allows the use of transmission geometry. After assembling the coin cells in a glove box, the gastight compartment of the sample holder allows safe transport of the batteries to the diffractometer.

For encapsulating the coin cell into the battery sample holder different window foil materials are available.

The best choice of the window foil is made based on your sample's region of interest.

High performance and easy handling

The direct heater in combination with the two possible cooling methods allows a fast heating and cooling performance. Highly accurate temperature measurements are conducted with a Pt100 temperature sensor located close to the sample. The instrument's design guarantees minimum thermal expansion of the sample holder and hence the correct geometrical position of the sample in the X-ray beam throughout the experiment.



Applications

In-situ and in-operando investigation of coin cells to gather the following information:

- Phase identification and quantification
- Phase properties (cell parameters, crystallite size, lattice strain)
- Dynamic structure changes

Features and benefits

- Temperature range from -180 °C to 130 °C
- Gastight battery compartment
- Fast heating and cooling
- Accurate temperature measurement conducted by a thermosensor close to the sample
- High position stability and minimum thermal expansion of the sample holder
- Easy handling and exchange of samples
- Compact design

Technical specifications

Temperature range	-15 °C to 130 °C (comp. air cooling) -180 °C to 130 °C (liquid nitrogen cooling)
Sample type	Coin cells
Sample size (diameter, height)	20 mm, 1.8 mm
X-ray geometry	Reflection & transmission
Electrical specification	I_{\max} : 1 A, V_{\max} : 10 V
Scan range	7° to 164° 2 θ (reflection) 0° to 70° (transmission)

Your distributor: