

UHV-Compatibility of encoded attocube rotator ANR101/RES/UHV with vacuum of up to $8 \cdot 10^{-11}$ mbar

Experiments in Ultra High Vacuum (UHV) conditions require highest precision and care in manufacturing of the respective equipment. The outgassing behavior is a crucial factor when researchers decide for new instruments in their setups. This application note describes measurements of the outgassing data of an attocube rotator with an integrated resistive encoder ANR101/RES/UHV (see Fig. 1). The tests were carried out at the BESSY synchrotron facility in Berlin, Germany.

The tests were split in two parts:

- a) Measurement of the reference mass spectrum of the empty vacuum chamber (green curve in Fig. 2)
- b) Measurement of the mass spectrum of the vacuum chamber after inserting the attocube rotator (blue curve in Fig. 2).

The vacuum chamber was baked out for three days at a temperature of 180°C. The turbo pump used had a pumping power of 180 l/s for N₂. After cooling down to room temperature a pressure of $7.3 \cdot 10^{-11}$ mbar was measured and a mass spectrum was taken.

Afterwards the rotator ANR101/RES/UHV was inserted into the vacuum chamber and baked out again for three days at 100°C. Due to this procedure an end pressure of $8 \cdot 10^{-11}$ mbar could be achieved. The measured mass spectrum is shown in Fig. 2 (blue curve).

The third (brown) curve in Fig. 2 illustrates the difference between both mass spectra. This curve shows emissions added by the rotator; these are at remarkably small levels. The peaks that are visible in the spectrum mainly refer to H₂O, CO, N₂, and CO₂, i.e. elements that were present in the chamber before. It is expected that these peaks can be further reduced by an increased bake out temperature and duration. In summary, this means that the positioner is perfectly suited for UHV use.

These experiments are an example for the outstanding UHV compatibility of the attocube systems positioning systems which are specified to pressures down to $5 \cdot 10^{-11}$ mbar.

The data was generously provided by Christian Kalus (christian.kalus@bessy.de) and Stefan Eisebitt (eisebitt@bessy.de), BESSY GmbH, Albert-Einstein-Str. 15, 12489 Berlin, Germany

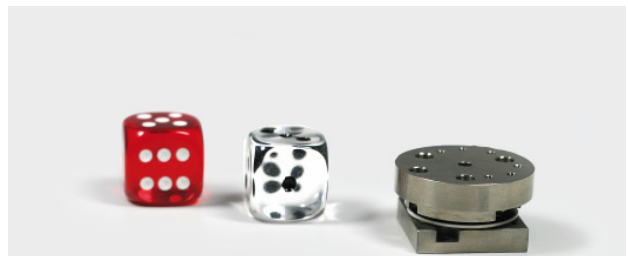


Fig. 1: attocube rotator ANR101/RES/UHV with an integrated resistive encoder. The /UHV model is specified for vacuum conditions of up to $5 \cdot 10^{-11}$ mbar and is bakeable to up to 150°C.

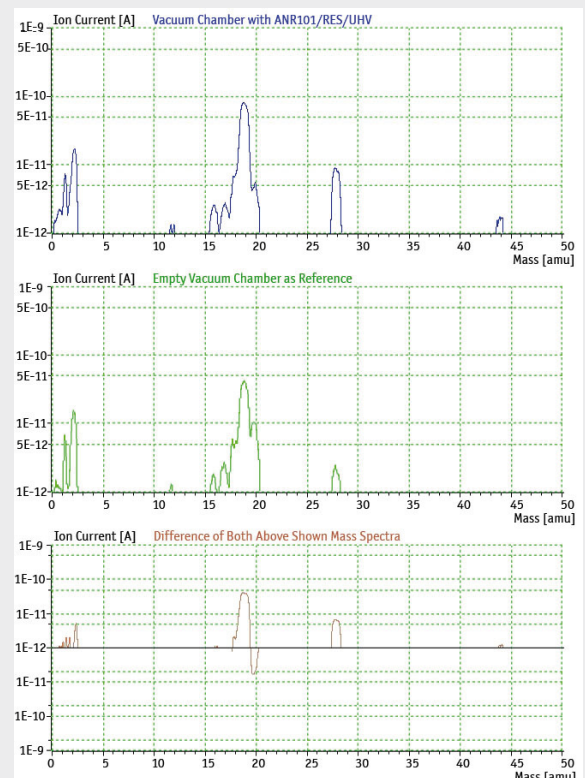


Fig. 2: UHV outgassing data measured at BESSY synchrotron facility in Berlin. **Blue curve:** mass spectrum of the vacuum chamber with an ANR101/RES/UHV inside. **Green curve:** reference mass spectrum of the empty vacuum chamber. **Brown curve:** Difference of both mass spectra. The peaks refer to additional emissions caused by the ANR101/RES/UHV.

RELATED PRODUCTS

ANR101/RES/UHV	high precision, piezo electric, inertial rotator for big loads
ANC150/1	electronic controller