THERMOCOMPENSATED QUARTZ CRYSTAL MICROBALANCE

General considerations

The program allows an enhanced accuracy in QCM measurements by canceling the frequency-temperature characteristics of a quartz resonator.

Before running the mass measurements, it is necessary to run a reference frequency-temperature characteristics for the quartz crystal resonator which will be used for mass measurements. A Pt-1000 temperature sensor should be placed very close to the quartz resonator. The switch in the "Record" area will be positioned on "reference". The temperature of both quartz crystal resonator and temperature sensor will be slowly increased, with a rate less than 0.5°C/min, to cover the whole temperature range where mass measurements will be performed. After sweeping this temperature range, the reference record will be stopped and a file with the extension .qrr will be saved.

To perform mass measurements the switch in the "Record" area will be positioned on "measure" and the previously recorded reference will be loaded by pressing "Ld r". The frequency and series resistance values, recorded at each temperature, will be read as reference values F_r and R_r. If some temperature readings are missing from the reference curve, the program will make an interpolation to evaluate the right frequency and series resistance. If several values of the frequency or series resistance are recorded at the same temperature the program will calculate their mean value, and this will be taken as true value of the frequency or series resistance at that temperature.
Further, the program works as a differential QCM, subtracting the quartz resonator temperature characteristics from the measuring curve, providing thus, more accurate results.

The program is very useful when mass measurements are intended at high temperatures in Chemical Vapor Deposition (CVD), Atomic Layer Deposition (ALD) or Thermogravimetric Analysis (TGA).

More details about the general use of the program are provided in the description of the "Dual QCM" and "Differential QCM".