

Contents

DEVICE OUTPUT 1
NUMERICAL RATING 2
GRAPHICAL RATING 2

DEVICE OUTPUT

The device measurement output is both numerical and graphical. There are two types of measurements:

1. Measurements of the impedance modulus at a single frequency of 0.1 Hz. These measurements are most suited for field use, for measurements at multiple locations, or in the laboratory, for measuring impedance of a large number of specimens. The number of points sampled at 0.1 Hz is chosen arbitrarily from 1 to 10.

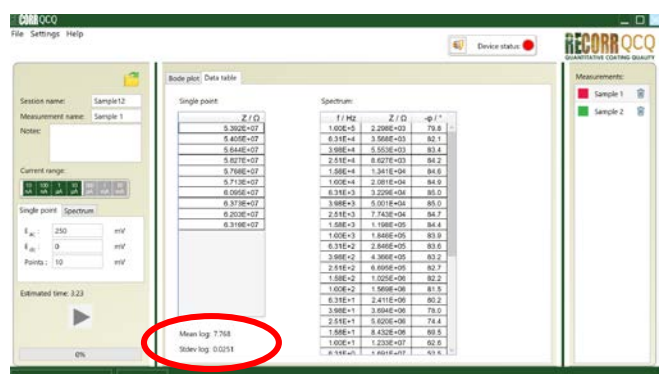
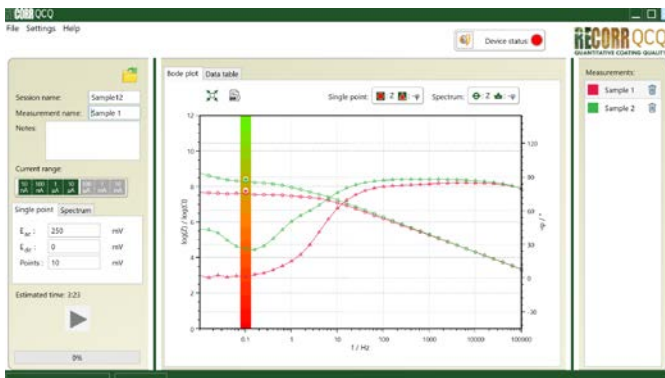
Data points are shown graphically within a coloured ribbon at the *Bode plot* tab. The colours of the ribbon indicate the coating quality.

Data points are given numerically, in the *Data tab* shown in the left table of the *Data table* tab. The mean and the standard deviation of the logarithm of coating impedance modulus@ 0.1 Hz, are shown below the table (circled in red).

2. Spectral measurements are done when more detailed insight into the quality of the coating is required or e.g. when unexpected results are observed by a single frequency method.

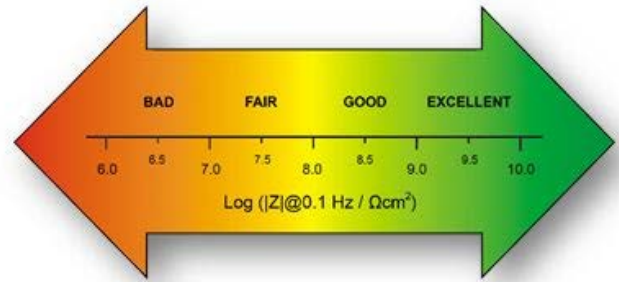
Data points are shown graphically at the *Bode plot* tab. The measurement of a spectrum is done in a chosen range, within the upper limit of 100 kHz and the lower limit of 0.01Hz.

Data points are given numerically, in the right table of the Data tab.



NUMERICAL RATING

Coating quality rating from the single-frequency measurements @0.1 Hz may be done according to the scale in the figure on the right. Scientific and professional literature takes the logarithm of coating impedance modulus @0.1 Hz as indicative of coating quality and sets the lower limit of good coatings to $10^8 \Omega \text{ cm}^2$ and the upper limit of poor coatings to $10^6 \Omega \text{ cm}^2$.

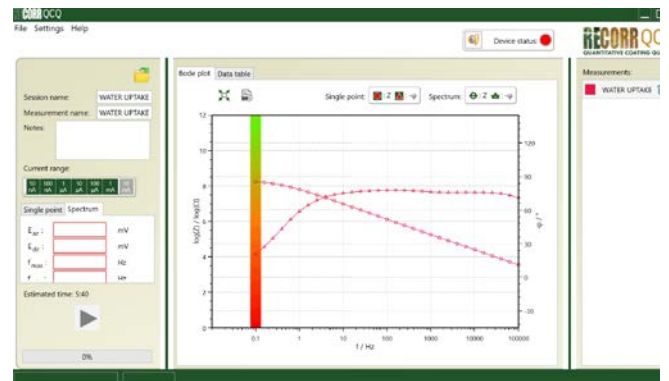


GRAPHICAL RATING

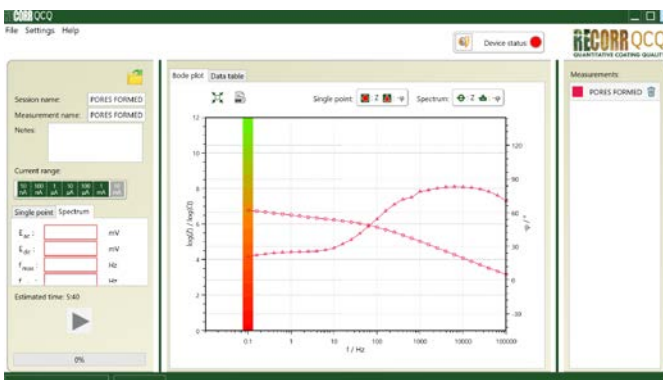
For the purpose of coating assessment, the two types of graphs are analysed: the *logarithm of impedance modulus (log|Z|) v.s. logarithm of frequency (f)* and the *negative phase angle (-φ) v.s. logarithm of frequency*.



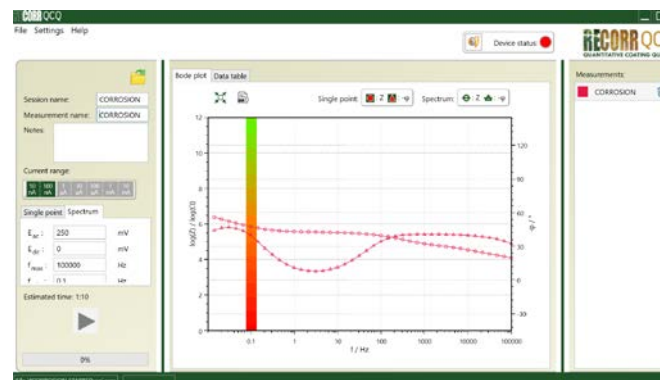
Intact or excellent barrier coatings show almost linear $\log(Z)$ and a $phase\ angle$ close to -90° in the whole frequency range.



Barrier coatings with absorbed water show a fall in $\log(Z)$ and a decrease in the $phase\ angle$ at low frequencies.



Barrier coatings with absorbed water and pores reaching the substrate show a fall in $\log(Z)$ and slightly visible maximum of the $phase\ angle$ curve that remains close to zero at low frequencies.



Coatings with corrosion at the substrate show a plateau of the $\log(Z)$ at medium frequencies followed by further increase in $\log(Z)$. The $phase\ angle\ curve$ first falls then raises attaining a maximum at low frequencies.