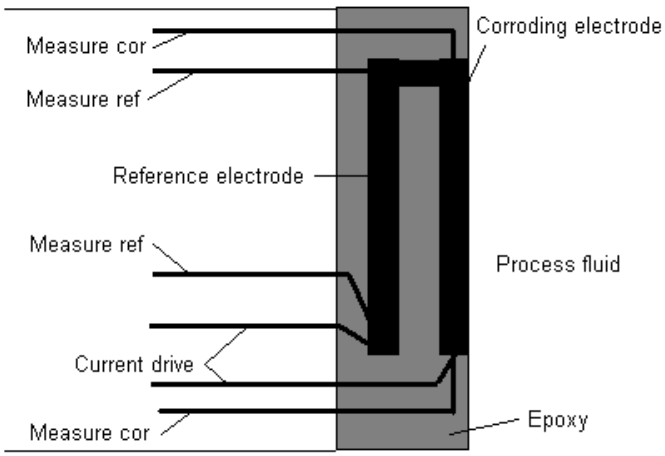
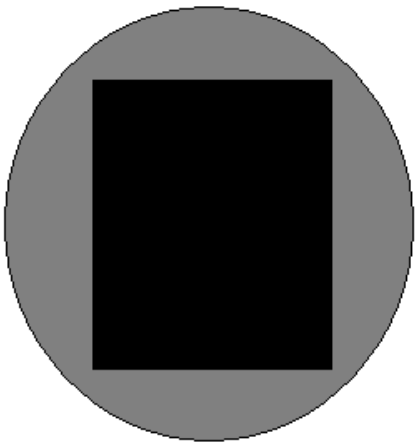
ACM Instruments

Electrical Resistance

This technique is not electrochemical but relies on the increase in electrical resistance of a metal sample when the metal sample is thinned as a result of corrosion compared to a reference element of the same material. Commercial probes are usually used but laboratory constructed ones can work well. The slow metal loss is recorded against time. To measure Electrical Resistance using a Gill AC the optional ER box is plugged into a small connector on the back of the instrument. This conditions the signal across the sample and non-corroding reference applying enough gain to send a very strong signal to the twin 21 bit analysers within the Gill AC. ER may be used for virtually all environments gases liquids or solids whether conductive or non-conductive. The effect of pitting on probes completely destroys the uniform corrosion result and can be a problem. The art of good probe design is to keep the corroding and reference elements at the same temperature.



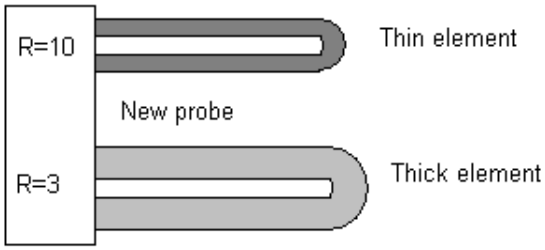
Typical flush probe cross-section



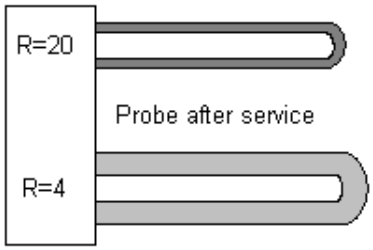
Front view of flush probe

In this case the reference and corroding elements are sandwiched together and rapidly reach the same temperature. A novel electrode design uses both elements in the process stream and relies on the ratio of surface area to volume been larger on one element than the other. As both experience the same corrosion rate at the surface the thinner element will show a different rate of

change of resistance. The metal loss for the thinner element can then be calculated. This allows for almost perfect thermal accuracy. In the example below the ratio changes from 3.3 to 5 after exposure allowing metal loss to be calculated using software supplied free of charge by ACM.



Thin/Thick ratio = 3.3



Thin/Thick ratio = 5