



## Technical note series: How to Calibrate an Electronic Active Filter

As most engineers will be aware it is essential that your test equipment is calibrated to ensure correct operation within its design specifications. An electronic active filter is no different, it uses analog electronics to create complex filter shapes and also provide high levels of signal amplification. As with any electronics based system it should be checked via a calibration process, as a manufacturer we always recommend a calibration period of 12 months.

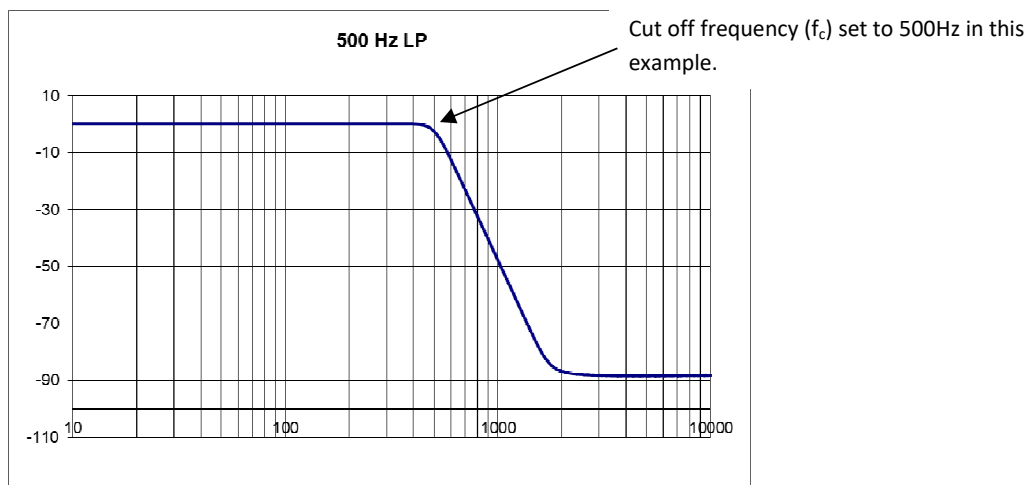
There are some fundamental test requirements when calibrating an analog filter system which are not widely known and a majority of equipment calibration laboratories including those with ISO17025 accreditation do **not** fully calibrate the filter unit.

Most electronic based amplifier units are only ever calibrated to check the gain stages of the amplifier circuits. Unfortunately this is the extent of what most calibration labs do when being presented with a Kemo filter unit, regardless of model number.

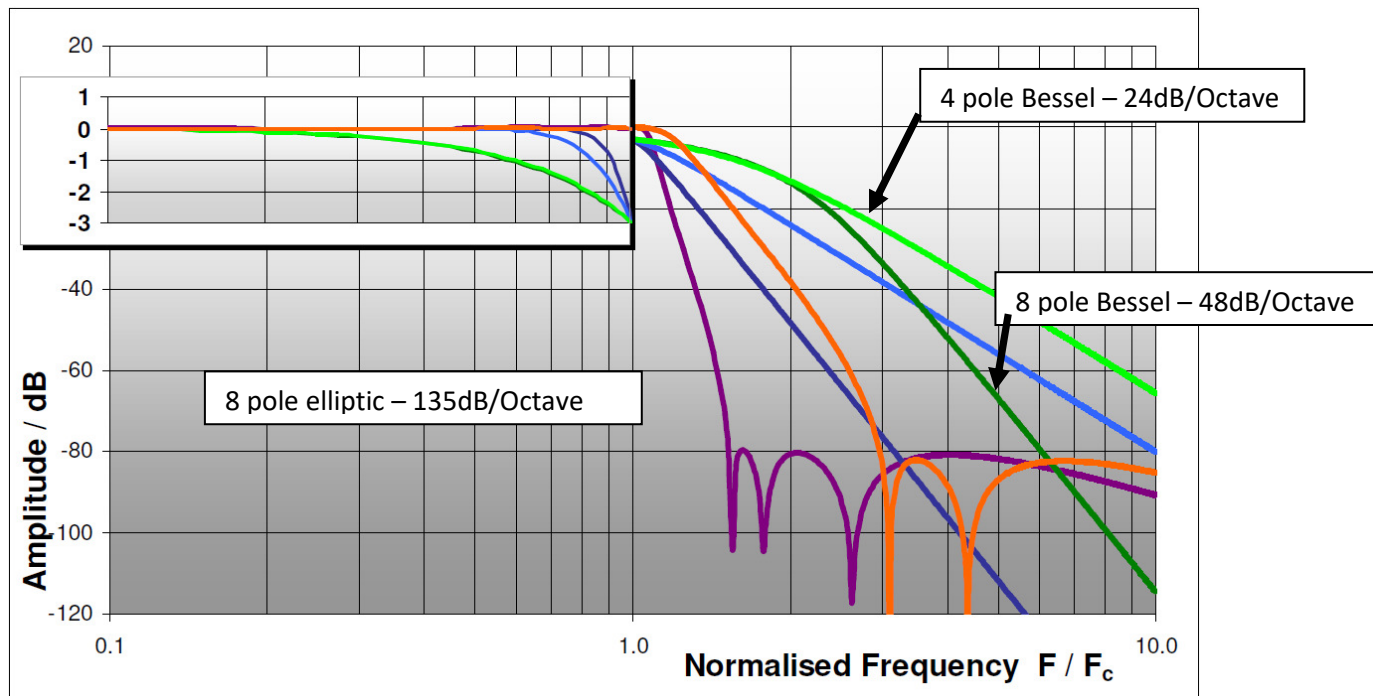
The key element that these labs are not equipped to do is to check the specific filter shape and performance for each of the channels, to do this you require a knowledge of the detailed filter specification, this is the expertise offered only by Kemo. In addition should the filter require adjustment this is a job which should only be done by Kemo Limited and should never be attempted by anyone without the circuit knowledge of the filter design.

### Key aspects to check during a filter calibration:

**Cut off frequency:** The cut off frequency point actually varies from one filter type to another, for example, the Butterworth filter cut off frequency is applied at the -3dB point, whereas an elliptic anti-aliasing filter is at 0dB. This must be checked to be within specified limits.



**Attenuation:** The attenuation for each filter type should also be checked to ensure it remains with the defined roll off for each filter type. A 4 pole filter has a very different attenuation than an 8 pole and an 8 pole Butterworth is very different to an 8 pole elliptic type.



**Pass Band :** Each filter type has a different characteristic of the pass band, whether this is the flatness or level of passband ripple. One other key feature of a filter is its response to a step input, certain types such as a Bessel filter have a very short time response, these key criteria should always be checked.

#### Summary:

A return to Kemo Limited calibration is the only way to confirm the full operating performance of your Kemo filter, we include the following as standard for every filter calibration on every channel (where the functions are fitted):

- All gain steps across full operating bandwidth
- Full Filter Performance tested against Kemo's own filter reference data
- IEPE signal supply
- AC/DC coupling
- Single Ended/Differential input
- Low pass and/or High Pass

Where necessary a Kemo can also make the necessary adjustments to bring your unit back into specification, unless a significant fault is found requiring a more detailed repair.

Kemo Ltd [sales@kemo.com](mailto:sales@kemo.com)

This document, its content and copyright belongs to Kemo Limited ©2024