

FREQUENCY RESPONSE ANALYSIS TEST, STANDARIZED FILE FORMAT ACCORDING TO IEC 60076-18

Problem

Since the early 80's several techniques and devices have been used as research tools for analyzing frequency response of transformers.

The researching companies used disparate hardware and therefore measuring result formats were not compatible with each other and so were difficult to compare.

As a first step towards harmonizing the analysis, a comparison between different, commercially available instruments was done on a power transformer. The main conclusion of this comparison was that results could be compared if the measuring band, the input impedance and the grounding setup is done in the same way. It was also concluded that measurements at frequencies above 2 MHz were drastically influenced by the connection setup and therefore not reliable.

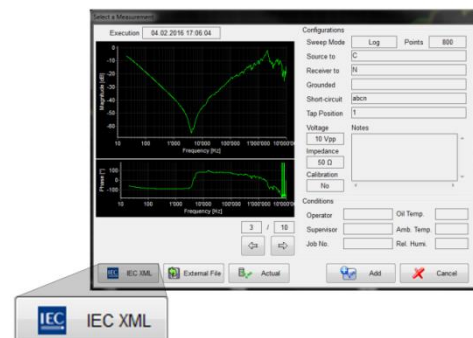


The Solution

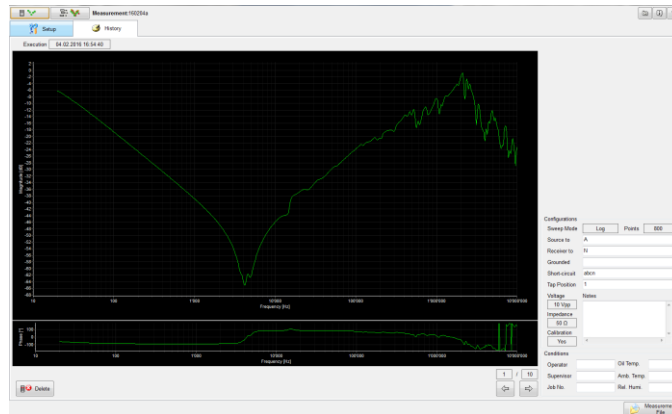
As a result of research through the years, in 2012 The IEC 60076-18 1.0 was released with the aim of standardizing the Measurement of frequency response in power transformers. Between other important remarks such as measuring band and ground setup, **a file format** was provided in “**appendix E**” with the aim of being able to share measuring data between different measuring instruments.

Tettex instruments has followed the recommendation of the standard and has implemented this file format in the Tettex FRA5310 making it possible to export or import test results.

With this feature, loading test results done with other manufacturer's measuring devices is now possible, as long as the manufacturer of that device has fulfilled the requirements of the IEC60076-18 -appendix E file format. In addition, a test done with the Tettex FRA 5310 could also be loaded by any other device capable of reading this file format.



Tettex instruments also delivers with each instrument an office version of the device software, which allows the operator to load test from FRA 5310 (native or IEC recommended file format) or from any other device (IEC recommended file format) and perform the analysis and reports easily on this computer without the need of a measuring instrument.



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- <IECFraFile Version="1.0">
  - <Transformer Identifier="">
    <Manufacturer/>
    <SerialNumber/>
    <Date>2016-02-04</Date>
    <Time>16h54</Time>
  </Transformer>
  - <MeasurementSetup>
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    <PeakVoltage unit="V">10</PeakVoltage>
    <ReferenceTerminal>A</ReferenceTerminal>
    <ResponseTerminal>N</ResponseTerminal>
    <ConnectedTerminals>abcn</ConnectedTerminals>
    <EarthedTerminals/>
    <OLTC from="??">1</OLTC>
    <DETC>1</DETC>
    <TransformerTemperature unit="°C">INF</TransformerTemperature>
    <Fluidfilled>??</Fluidfilled>
    <LengthOfUnshieldedConnection unit="mm">200</LengthOfUnshieldedConnection>
    <Comments/>
  </MeasurementSetup>
  - <MeasurementResult>
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    <Point phase="-5.76330E+1" amplitude="-6.21580E+0" frequency="2.02656E+1"/>
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    <Point phase="-5.91446E+1" amplitude="-6.51130E+0" frequency="2.13087E+1"/>
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    <Point phase="-6.16882E+1" amplitude="-7.14547E+0" frequency="2.35438E+1"/>
    <Point phase="-6.22842E+1" amplitude="-7.25969E+0" frequency="2.38419E+1"/>
  </MeasurementResult>
</IECFraFile>
    
```

IEC 60076-18 Appendix E XML format for frequency response analysis test example

Additional comments

To address the grounding setup difference, we deliver the necessary material to measure with a particular setup (low inductive band connected parallel to the bushing) to make sure that measurement result is correct. In addition we supply active probes to reduce the influence of the measuring cable.

