

The IEC 61869 standard for Instrument Transformer, conventional and LPIT, specifies several bandwidth and accuracy class extension for harmonics in Protection, Measuring and Wide bandwidth application:

Application	Accuracy class extension for harmonics	Bandwidth	Digital Sampling Rate IEC 61869-9
Protection LPIT		up to harmonic 5	80xfr, 4800 Sps
Measuring	WB0	up to harmonic 13	80xfr, 4800 Sps
Wide bandwidth	WB1	up to 3 kHz	256xfr, 14400 Sps
	WB2	up to 20 kHz	
	WB3	up to 150 kHz	
	WB4	up to 500 kHz	

For all LPIT's and SAMU, extension WB0 is mandatory, while the extensions WB1, WB2, WB3 are optional.

LPIT offer usually inherent large bandwidth due to their low power characteristic associated with a low load.

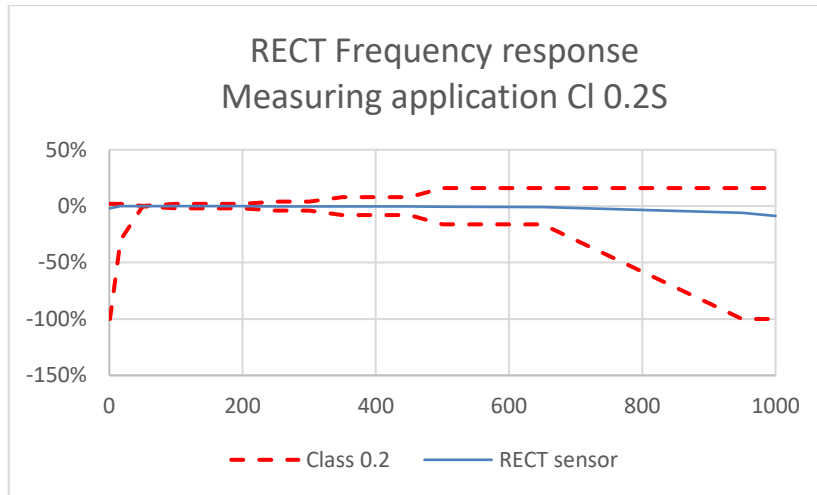
In practical several thinks lead to reduce the bandwidth:

- Filtering to suppress the effects of VFT and lightning impulse waves
- Signal/Noise requirement ask by the IEC 61869 Standard
- Analog cable length
- Anti-aliasing filtering in case of digital output

In case where only one sensor is used for all applications Protection, Measuring and WB1 - usually called Qualimetry a bandwidth of 3kHz (up to harmonic 50 @ fr = 60Hz) is easily achievable. Bandwidth for Protection and Measuring are reduced to 1.5kHz according to sampling rate.

In case where a specific sensor for qualimetry is used other than for protection and measuring application, a wider bandwidth could be achieved like the WB2 or WB3.

The new edition of the IEC 61869-1 standard offers the possibility to use the mechanism introduce by the IEC 61850-7-4:2020 Ed 2.1 allowing the IT frequency response compensation factors to be exposed to the IED by using the frequency correction setting. Correction factors are provided in the form of "Curve shape setting". So, for example, the attenuation of anti-aliasing filter can be corrected.



Example of frequency response of a Rogowski Electronic Current Transformer in GIS application for measuring application able to measure harmonic 13 according to IEC 61869:

The WB1 can be achieved with the current LPIT electronic, the sensor itself as the intrinsic characteristic for supporting the WB2-WB3 nevertheless an electronic with dedicated filters should be designed. Thanks to the compacity of the sensors, a dedicated one can be added as presented in the figure below.

