Ultrasonic flowmeter – Diagnostic parameters correlation with the flowmetering accuracy

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The use of the ultrasonic flowmeters has increased [considerably](http://context.reverso.net/traduction/anglais-francais/considerably) on the French transmission natural gas grid. The main advantage of these flowmeter is their very high flow range, more than 100, compared to the turbine flowmeters. Another interesting advantage is their diagnostic ability. This diagnostic are automatically achieved by the ultrasonic flowmeter. It relates to both the metrological (flow profile, asymmetry, swirl, turbulence intensity, profile factor...) and the intrinsic integrity (transducer integrity, signal-to-noise ratio, signal gain...) behaviours. Recent researches show that these diagnostic parameters can be linked to the metrological behaviour and more particularly to the flowrate measurement accuracy. This aspect is highly interesting for the transmission grid operators. It provides them the possibility to monitor in real-time the accuracy of the ultrasonic flowmeter and therefore determining the “better time” for it calibration verification.

It is in this framework that the CRIGEN performs an important test campaign on three different ultrasonic flowmeters (KROHNE, ELSTER-INSTROMET and SICK) with different installations conditions (in line, with a simple bend, with a double out-of-plane bends, with a divergent and with a half-moon). These tests show that some of the metrological diagnostic parameters have a direct correlation to the metrological behaviour of the ultrasonic flowmeter and to it accuracy.

This paper answers the flowing issues:

* establish the metrological behaviour of each ultrasonic meter in the case of the in-line tests and the footprint of each of them,
* analysis of the impact of each of the installation condition on the flowmeter accuracy,
* establish which diagnostic parameters are correlated to the ultrasonic flowmeter flowmetring accuracy and identify the type of correlation,
* what is the most relevant threshold for each diagnostic parameter in order to ensure a low level of the impact on the metrological behaviour for each ultrasonic flowmeter.