



Acoustic Diagnosis of Gas Insulated Substations (GIS) in Normal Operation



AIA - Acoustic Insulation Analyzer
Check your GIS without disturbing normal service operation

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- Check your GIS without disturbing normal service operation.
- Get a unique opportunity to detect, locate and identify most common defects in GIS such as particles, partial discharges etc.
- AIA has a unique sensitivity that enable you to classify whether a flaw is harmful or not.
- Well accepted and tested method according to Electra 176 on «Return of experience, on site test and diagnostic techniques».

APPLICATION

- Determine whether a flaw is present in the insulation of GIS system or not, such as:
 - Bouncing particles.
 - Partial discharges from Protrusions and/or Loose shields.
- Condition based monitoring of GIS during commissioning and in service.
- Design and factory tests during manufacturing.

PROPERTIES

- The instrument is by an ultrasonic sensor monitoring the acoustic signals. A microprocessor controls the data collection and data-processing.
- The results are presented on a LCD screen during measurements and may be stored and transferred to a PC via an RS-232 serial communication interface.
- The user communicates with the instrument by means of soft touch buttons on the front. Settings of filters, time constants and trigger circuits are all menu controlled.
- For easy use, recommended default settings of parameters are included.

AIA has three measuring modes, continuous, pulse and phase mode

- The continuous mode gives:
 - RMS signal during one power cycle.
 - Peak signal during one power cycle.
 - Degree of modulation with the power cycle.
 - Degree of modulation with twice the power cycle.

This continuous mode gives the first

- Use AIA efficiently as a part of the regular maintenance program to save money and obtain increased reliability of the supply.
- AIA is portable, battery powered and very easy to use via menu controlled software.

The acoustic technique used in AIA is widely known and accepted as a diagnostic tool for Gas Insulated Substations (GIS)

information about the signal, indicating the type of flaw. 50 (Frequency 1) or 100 Hz (Frequency 2) content suggests that a partial discharge is present. A fluctuating peak signal suggests that one or more particles are present. Figure 1 shows the result from measurements on a floating shield.

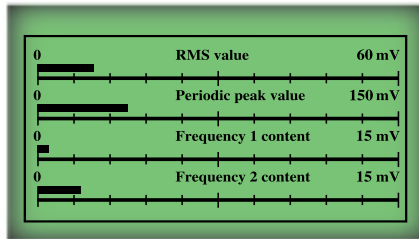


Figure 1: Continuous mode measurement screen of a floating shield.

- The pulse mode mode gives:
 - Peak value of impulse signal.
 - Time since last pulse.

The peak value and time since the previous pulse are plotted in an elevation time vs. amplitude plot. For a 5-mm Al particle the picture is as shown on Figure 2.

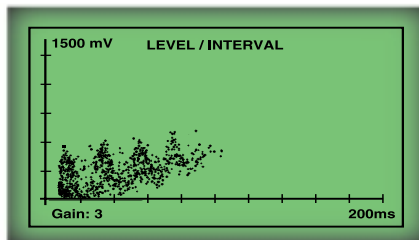


Figure 2: Plot of a 5 mm Al particle.

- The phase mode gives:
 - Phase angle of pulse occurrence.

SENSITIVITY

- The acoustic measurements with AIA show better sensitivity



TECHNICAL

Dimension:

Instrument:
WxHxD = 25x15x 31 cm
WxHxD = 10x6x12 in

Transport case:

WxHxD = 40x22x 80 cm
WxHxD = 16x9x32 in

Weight:

Instrument: approx 6 kg / 13.5 lbs
Total Weight: approx 27 kg / 60 lbs
including case and users guide

Display:

LCD W: 8cm/3 in H: 10 cm/4 in
Resolution 128x160 pix

Mains voltage:

110-230 VAC. 50/60 Hz
110 VDC
Battery: 12V, 4 Ah

ty than conventional methods (IEC 270). Particles as small as 2 mm are detected with AIA during service, whereas 5 mm particles are detectable with conventional method in the laboratory For protrusions the sensitivity is just as good.

Figure 3 shows the phase of the power frequency at the moment of discharge. This feature is most useful at partial discharges. For an electrically loose shield the pattern in Figure 3 appears.

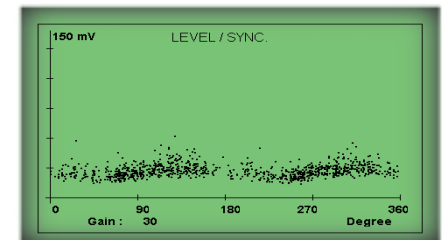


Figure 3: Phase plot of a loose shield.

Application of AIA on GIS

- Using AIA to measure on GIS is easy. A cable connects the sensor to the front plug of the instrument, and may be held by hand or mounted to the GIS by a flexible band. Flaws are located by moving the sensor to the place where the signal level is highest.