

OPERATION DESCRIPTION:

The SENIS' Insulation Defect Locator (IDL) utilizes two high sensitivity clamp-on MicroAmmeters to indirectly measure and track direct current passing through a defect or fault in the insulation system and determine the position of a leakage current path to ground. The IDL is capable of being used with the insulation system energized to high voltage. By indirectly measuring the leakage current, the defect or fault can be located without cutting conductors or removing insulation. This avoids the "divide-and-test" methodology (costly destructive procedure), allowing the user to locate the defect quickly and significantly reduces repair time and effort.

This system has been designed for use with, but is not limited to, large hydro generator stator windings.

The front-end of the open-loop MicroAmmeter is a clamp-on toroidal ferro-magnetic core with an air gap, in which the Hall elements of a differential Hall magnetometer is inserted. The system includes a demagnetization circuit for the ferro-magnetic core and a PC software for data acquisition and visualization. The IDL System is controlled by a laptop PC with LabView software to control the High Voltage Power Supply output voltage and to acquire the instantaneous current outputs from the two

KEY FEATURES:

- **Two clamp-on DC Current Transducers (MicroAmmeters) to enable current difference measurements in electrical conductors at high voltage**
- **Open-Loop Current Sensor**
- **Demagnetization of the ferro-magnetic core**
- **For insulation defect location, conductors do not have to be cut or insulation removed**
- **Simultaneous current measurements enable defect or fault location in complex systems, even with more than one leakage path to ground**
- **Computer control via fiber-optic isolated USB interface for electrical isolation and operator safety**
- **High Voltage Bias Power Supply output ramp profile provides the reproducible, smooth voltage ramps to avoid high current capacitive charging transients**

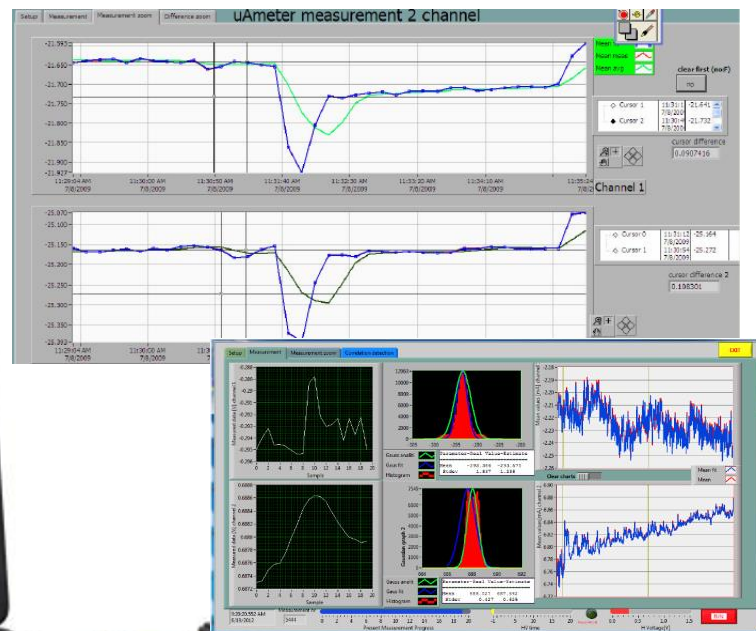


Figure 1. **Insulation Defect Locator Measurements Setup**

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The Insulation Defect Locator Measurement Setup consists of

- Two clamp-on 50-100H Current Transducers to enable current difference measurements in electrical conductors at high voltage (dimensions: 152x96x62mm; Sensitivity to external magnetic field: <math>< 5\text{mA}/50\mu\text{T}</math>; Voltage Isolation: $\pm 5\text{kV DC}$)
- System Interface (SI) to the Current Transducer 100E Amplifiers (Maximum Output Signal: $\pm 10\text{V}$ corresponding to $\pm 100\text{mA}$)
- Control Computer with the LabView software to control control the High Voltage Power Supply output voltage and to acquire the instantaneous current outputs from the two MicroAmmeters

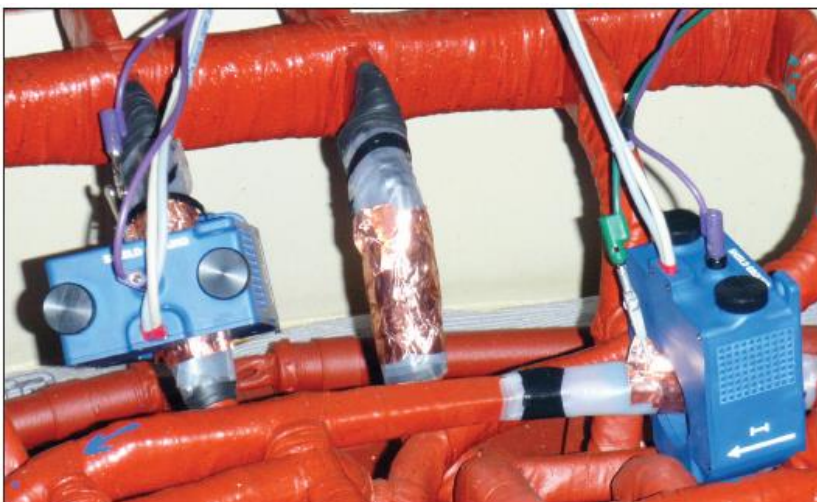
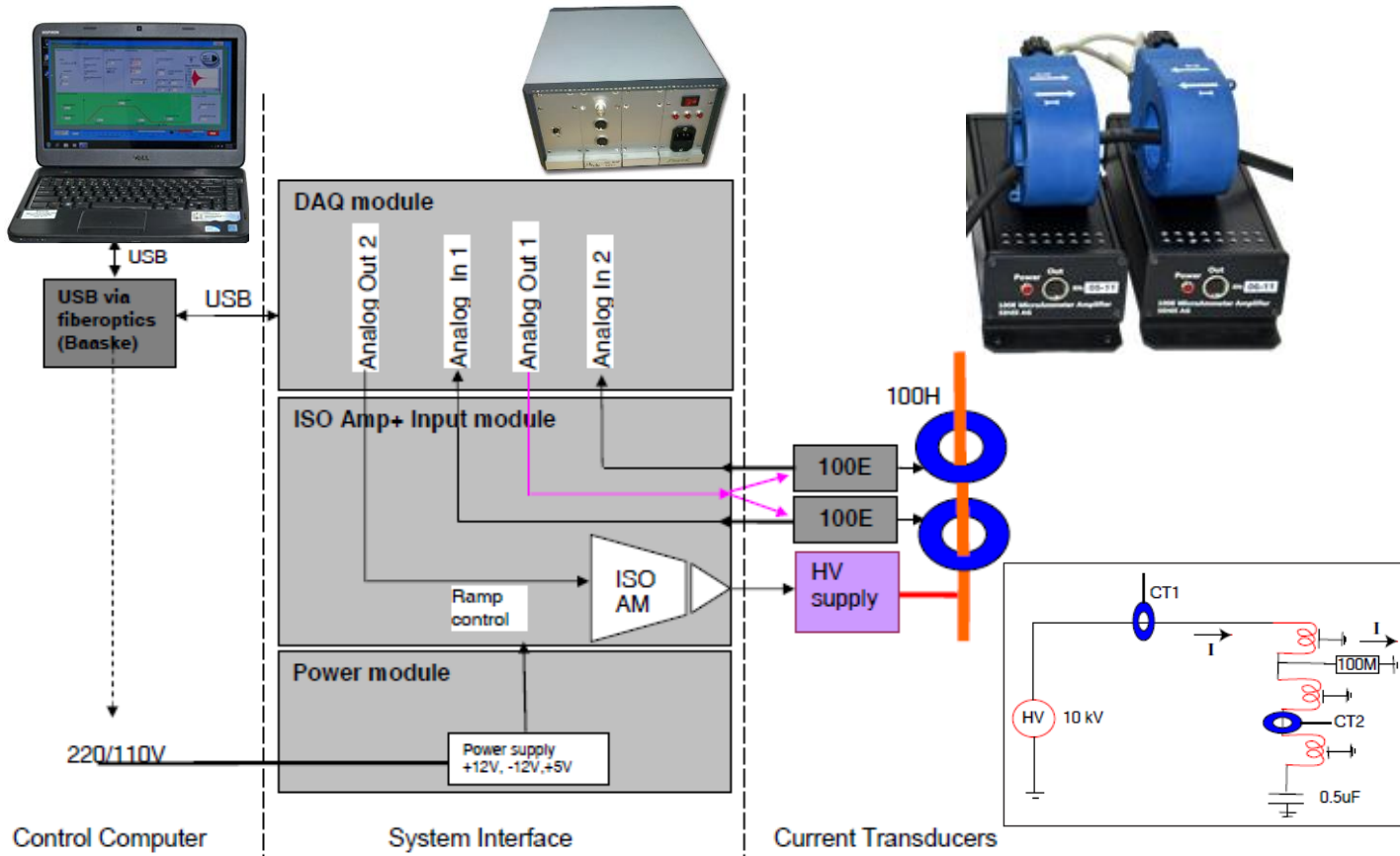


Figure 5: Application on Electrical Generator Stator. The two 100H Current Transducer Heads are shown installed on the winding links. Reprinted by permission from the US Department of the Interior, Bureau of Reclamation (USBR).



Figure 7: Assembling a 50-100H Current Transducer Head on a winding link of an Electrical Generator Stator. Reprinted by permission from the USBR.