

ON-LINE BUSHING MONITOR SENSORS

Bushing sensors vary in design from manufacturer to manufacturer. Therefore, it is recommended the user consult the manufacturer if attempting to modify an installation.

The majority of bushing designs incorporate a normally grounded voltage/test tap. The purpose of the cap covering the bushing tap is to complete the circuit between C1, C2 and ground and to prevent contamination of the tap from dirt, moisture etc... Removal of the cover opens this circuit allowing for de-energized power factor and capacitance testing of the insulating material of the bushing.

NOTE: For bushings types in which the tap is normally not grounded; high voltage is present at the tap at all times by design. These bushings types are addressed in Appendix "A"

The mechanical installation of an on-line bushing sensor replaces the cap's function of grounding the insulation layers as well as protecting the tap's internal components from contaminants. At the same time, the sensor creates an excellent electrical connection that allows the measurement of voltage and/or current present at the tap. With these measurements, changes in power factor and capacitance can be determined and trended.

Characteristic that must be considered when encountering a bushing sensor in the field:

1. The grounding characteristics of the sensor strictly prohibit the removal of the sensor while the bushing is energized.
2. The cabling from the sensor to its respective interface is part of the circuit. Therefore, breaking the connection of this wire could potentially cause a dangerous voltage at the tap that will lead to bushing failure. Manufacturers of bushing sensors have installed provisions for suppressing the voltage in this situation. Voltages at the tap ranging from 20 to 115 V have been documented from various manufacturers. It is recommended that care be taken and the individual manufacturer be contacted to determine repair options.
3. Removal of the tap sensor while the bushing is not energized will cause no damage to the sensor. It should be treated as a measurement device and its internal components and sealing mechanism kept clean and dry during the period of its removal. For off-line testing of the bushing, it may not be necessary to remove the sensor. It is advised that you consult the manufacturer.
4. Interfaces of the bushing monitor should be consulted to assure no self-diagnostic error indications are present before working on an energized system. Manufacturers and troubleshooting guides should be consulted if an error message is present.

Appendix A

Bushing types that have taps that are normally not grounded require specialized sensors capable of withstanding the high voltage present at the tap. Manufacturers of these sensors have incorporated provision for safe operation in these conditions. Practices followed during field encounters are the same with these sensors as with sensors on normally grounded taps.