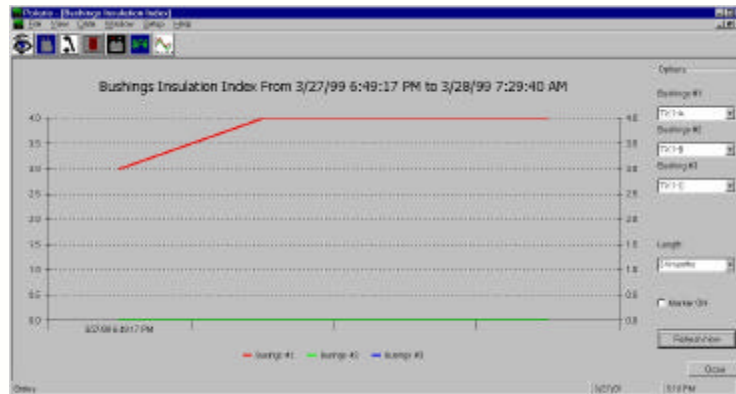


# POLARIS<sup>®</sup> Bushings Insulation Monitoring Module

## 1. INTRODUCTION

The continuous on-line bushings insulation monitoring system Hviews developed by the CSIR is a cost-effective software orientated, PC based monitoring system running on Windows 95/98/NT and using a standard SQL database for data storage.



## 2. MONITORING ALGORITHM

The system calculates the  $\tan(\delta)$  of a unit as a relative value compared with a reference voltage from another unit in service, thereby eliminating the need for a reference capacitor. The system is therefore a system based on relative  $\tan(\delta)$  values.

Relative measurements and evaluation can reduce the effect of influences such as ambient temperature, operating voltages, loading conditions, different aging characteristics, different designs, operating conditions, etc.

The dictionary defines “continuous” as “without interruption”. However, in the context of “continuous on-line monitoring” the selected time interval between measurements must be sufficiently short so that the process can be considered, for all practical purposes, continuous.

Sampling of all units in service occurs according to a user definable sampling schedule.

All measurements are tested for integrity against 3 parameters: RMS and mean of the signal, and  $\tan(\delta)$  value calculated. Only measurements passing the integrity tests are stored in the database.

Before data is stored to the database, averages are calculated – ignoring extreme values (basic filtering). A standard filter1 is also applied to the tan ( $\delta$ ) values being stored in the database. Technical experts can adjust the filter factor.

All data is ‘continuously’ analyzed according to a user definable frequency (in hours). The evaluation of the data is based on a comparison of measured values with historical data for each particular unit.

From the analysis, the software calculates an “absolute” condition value for every unit in service. These values range from 0 (good) to 100+ (bad). Simple “green, yellow, red” indications of the condition of equipment are given based on these condition values.

### 3. SPECIFICATION

- One capacitive divider unit (CDU) for each test point
- One measurement tap unit (MTU) for three CDUs
- Junction Box
- Front-end Processing Box with
  - Input conditioning board
  - Rendezvous board
  - Watchdog board
  - Alarm board
- 32, 64, 128 Test Points (input channels)
  - Nominal signal level: 40Vrms, 50/60Hz
  - Isolation between inputs: 3000V
  - Surge withstand capabilities: ANSI/IEEE C37.90.1-1989