SCOPE

SA 30i

Surge Arrester
Leakage Current Analyser

Online measurement of 3rd harmonic resistive leakage current of HV/EHV surge arresters with system harmonic compensation...

... with SA 30i

The Product

SA 30i Surge Arrester Leakage Current Analyser

SA 30i, the Leakage Current Analyser from SCOPE is a State of the Art, On-line test system for Residual Life Assessment of Metal Oxide Surge Arresters. The instrument measures and directly displays the values of Total Leakage Current and Third Harmonic Resistive Leakage Current. It provides system harmonic compensation as per IEC 60099-5-B2. It provides Corrected Resistive Leakage Current after applying correction factors for change in system voltage & temperature.

The SA 30i can be pre-loaded with the LA identity details (LA Identification, Type, Serial Number, Location, Rated Voltage etc.) and tests conducted on the same ID of the arresters are saved under the same folder. Trend analysis software, SAData picks up this data and stores them in a similar fashion on a PC. This analysis software enables the user to take a decision to repair/replace the arresters considering safety limits.

SA 30i is designed to work under the hostile electrostatic noise found in live EHV switch yards upto 765 kV.

1. CT signal to Oscilloscope
2. Field Probe signal to Oscilloscope
3. Calibration Port
4. Field Probe / External PT Input
5. CT Input
6. 20 X 4 Line Backlit LCD Display
7. Master Earthing Connection
8. Temperature Sensor
9. Key Board
10. Thermal Printer
11. 1A Slow Blow, 20mm in series with supply
12. USB Port for PC Communication
13. Charging Input Socket (13.5V/1.5A)
14. Power ON/OFF Switch

The Measurement

The performance of surge arresters depends on the insulating property of metal - oxide (ZnO) blocks used in arresters. The deterioration of the insulating property increases leakage current in the arrester. This leakage current depends on applied voltage and temperature at the time of measurement. The nonlinear characteristics of ZnO blocks used in arresters clamps the over voltage generated due to surges and lightning, to normal level and ultimately protects the critical equipment. In the normal configuration of arrester, at one end system voltage is applied and the other end (base) is earthed through earth lead. The arrester is mounted on insulated base. The leakage current in arrester thus flows to the earth.

The Total Leakage Current is combination of Capacitive Leakage Current & Resistive Leakage Current. In normal life of arrester there is very little change in capacitive current. However there can be significant increase in resistive leakage current due to deterioration of insulation properties of arresters. This may happen due to entry of moisture in ZnO blocks or by premature aging of ZnO blocks. Resistive leakage current is in phase with the applied voltage, so it generates power loss in the form of heat. It may lead to cascading effect & accelerated failure of arresters.

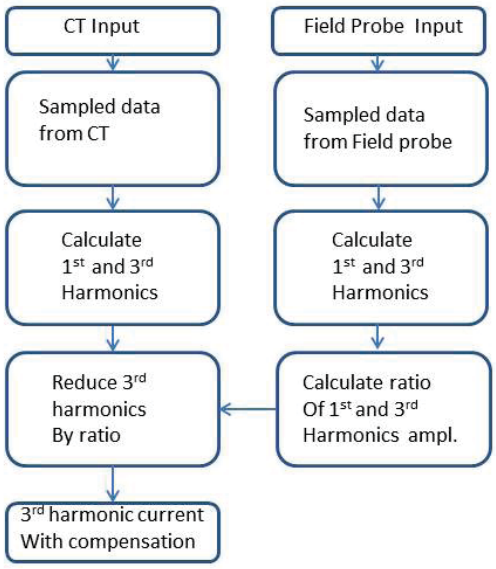
The surge arrester have tendency of failing violently thereby causing damage to adjacent equipment and posing a grave risk to personnel working nearby. Hence it is of utmost importance to periodically assess the healthiness of the arresters to prevent any such failures. IEC standard 60099-5 has recommended various methods for Leakage Current measurements on surge arresters. Following two methods are found to be most effective for assessing the healthiness of surge arresters. SA30i is provided with Method 1 by default. Method 2 is available optionally.

Method 1: Third Harmonic Resistive Leakage Current Measurement with System Harmonics compensation (IEC 60099-5-B2)

When voltage is applied to the arrester, due to non-linear voltage current characteristics of a metal-oxide used in arresters, harmonics are generated in the leakage current. In all the harmonics, the third order harmonics, which is predominant depends on resistive current of arrester. The magnitude of third order harmonics in the leakage current can be used as indicator of resistive current. The resistive component depends on applied voltage and temperature

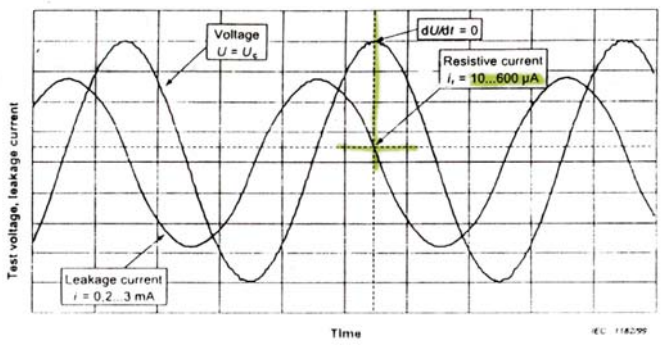
However as the system voltage itself may contain the harmonics which will significantly influence the measurement of third harmonics in leakage current. Hence it is very important that the effect of these system harmonics is compensated to get correct results that reflect the healthiness of arrester.

SA30i reads the total leakage current flowing through the earth conductor of arrester through a specially designed Clamp on CT and calculates third order harmonic current from it. Also a special Field Probe is placed at the base of LA to measure the third order harmonic component present in system voltage and to apply the compensation for the same. This compensated current is shown as third harmonic resistive leakage current.



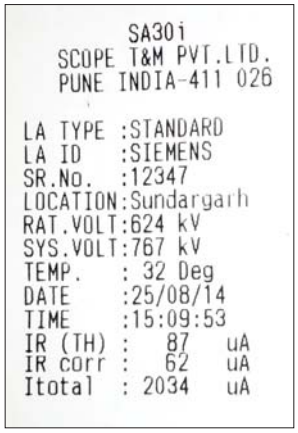
Method 2: Voltage Peak Method (IEC 60099-5-A1) (Optional)

The method A1 of directly measuring resistive current involves using a reference signal which represents the applied voltage to the arrester. This signal can be used for measurement of resistive component in the leakage current at the instance of voltage peak. This means, the amplitude of current in the current signal, when reference voltage signal is at peak is the actual resistive leakage current. This method is suitable for GIS LA's and factory or lab test.



Special Features

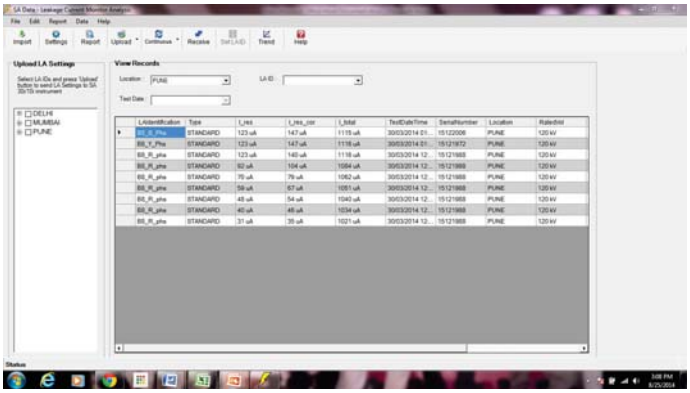
- An innovative design makes SA30i simple, lightweight, portable, feature-rich.
- Measures Total Leakage Current, 3rd Harmonic Resistive Leakage Current with System Harmonic compensation and Corrected Resistive Leakage Current.
- In built temperature measurement facility enables calculation of temperature corrected leakage currents.
- Correction of results to rated voltage of LA to eliminate effect of change in system voltage.
- Date and time stamp on test results
- Results are displayed on large font, Big, back-lit LCD, printed on in-built thermal printer and can be stored in memory of the instrument.
- SA 30i is powered by easily available re-chargeable Lithium-ion batteries. It works for a day's testing needs on a single charge
- The SA 30i is a switchyard compatible instrument. This makes the instrument extremely convenient to use.
- Built-in standard calibration source and self-calibration check facility
- USB communication port to transfer data to PC and Windows based PC Downloading & Analysis Software.
- Facility of extending CT & Field Probe signal to external oscilloscope.
- Facility for testing of GIS LAs available optionally

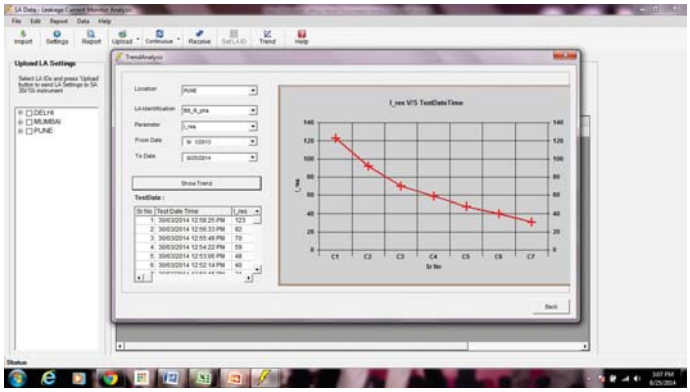


SAData : PC Downloading & Analysis software

SAData is windows based software that enables creating folders of LA Identity details on PC and uploading the same to instrument as well as downloading of test results from instrument to PC. This ensures that library of various LA ID's is generated in software. Once user creates & upload the LA ID to instrument, all result taken on that LA will be stored under same ID folder even when they are downloaded to PC. It ensures structured storage of results of even huge nos. of LAs. Instrument can be connected to PC in through USB port saving time.

Trend Analysis for trending of historical data of a specific LA over specified period can be done to predict the healthiness of a LA. The report generation for the tests taken is also possible. This report can be exported to various formats like PDF, Excel, in, etc. and also can be printed. You can add operator name and any additional notes if you want to add.





Corrected Third Harmonic Current

SA 30i has in-built temperature sensor which measures the ambient temperature & corrects the result to 20°C, as per IEC. It also corrects the results to the rated voltage of arrester to eliminate the effect of change in system voltage during measurement. These corrected results can be used for comparison of results over a period.

By default the correction factors for voltage as well as temperature are programmed as per the graphs given in IEC standard. The instrument also has a facility to program the voltage correction table. User can program this correction table as given by the LA manufacturer. This facility is provided through SAData software. User can define different correction tables for different types of LAs and attach it to the LA ID. While testing this LA, SA30i will refer the programmed correction table depending on type of LA instead of default correction table.

Specification

Parameter	SA 30i
Total Leakage Current Range	100 µA to10 mA
Resistive Leakage Current Range	1 µA to10 mA
Field Probe Current Range	10 µA to 1 mA
Resolution	1 µA
Accuracy	Value ± 5% ± 1 µA
Inputs	External Clamp-on CT, Field Probe,Optional External PT input (110V AC)
Display	4 line x 20 character large backlit LCD
Compensation	Automatic for System Harmonics,Temperature & System Voltage
Temperature Sensor	Inbuilt platinum resistance thermometer
Self-calibration Check	Available
PC Connectivity	Through USB Port
Memory	1000 Results
Printer	58 mm Inbuilt Thermal Printer
Battery	11.1V / 2200 mAh, Internal Rechargeable Battery
Mains Charger	100-270V AC, 50 / 60Hz ± 10%, 1 Phase
Dimension	415 x 330 x 200 mm
Weight	7 Kg, instrument
Environment	0 to 50°C, upto 95% RH (non-condensing)
Type Testing	As per IEC 60068 / IS 9000 for Dry Heat, Damp Heat, Change of Temperature, Bump, Vibration and Mechanical Shock. For EMI / EMC & Safety as per relevant IEC Standards.

Benefits

- Online, quick & effective assessment of residual life of surge arresters, saving possible failures & accidents
- Get early warning of LA failure and possible cascading effects
- Easy to use & highly portable
- Battery based operation enables measurement in absence of AC supply
- Reliability is proven in live EHV switchyard environment. CE Marked.
- Suits equally to Utilities, OEM's, Test Labs as well as Testing and Commissioning companies
- strong extendable mounting arrangement (rods) for Field Probe.

Accessories

Standard
Specially designed low noise, Clamp-on CT
Field Probe with extendable mounting arrangement organized in a light-weight carrying case
Test Lead Set, suitable for testing EHV class Surge Arresters
External instrument battry charger
Thermal Paper Roll
SAData PC Downloading & Analysis Software on CD
Calibration Certificate having traceability to NABL
Optional
Large size low noise Clamp on CT
Field PT Accessories for measurement with Voltage Peak Method

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