

SCOPE

SA 30i+ Surge Arrester Leakage Current Analyser



Online, wireless measurement of 3rd harmonic resistive leakage current of HV/EHV surge arresters with system harmonics compensation... SA 30i+

The Product

SA 30i+ Surge Arrester Leakage Current Analyser

SA 30i+, the wireless 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 results of tests conducted on the same ID of the arresters are saved in the same folder. Trend analysis software, SA Data picks up this data and stores it in similar structure on PC. This analysis software enables the user to take a decision whether to repair/replace the arresters considering safety limits. SA 30i+ is designed to work under the hostile electrostatic noise found in live EHV/UHV switch yards up to 1200kV.



- ① CT Charger
- ② FP Charger
- ③ Base Unit Charger Indication
- ④ Antenna
- ⑤ Calibration Check Port
- ⑥ Master Earthing
- ⑦ LCD Display
- ⑧ Mains Input Supply
- ⑨ Mains ON / OFF Switch
- ⑩ Thermal Printer
- ⑪ Power ON Button
- ⑫ USB Port
- ⑬ Navigation Key Board
- ⑭ Temperature Sensor

The Measurement

Performance of surge arresters depends on the insulating property of metal - oxide (ZnO) blocks used in arresters. 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 the 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.

Surge arresters 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. The following two methods are found to be most effective for assessing the healthiness of surge arresters. SA 30i+ is provided with Method 1 by default. Method 2 is available optionally.

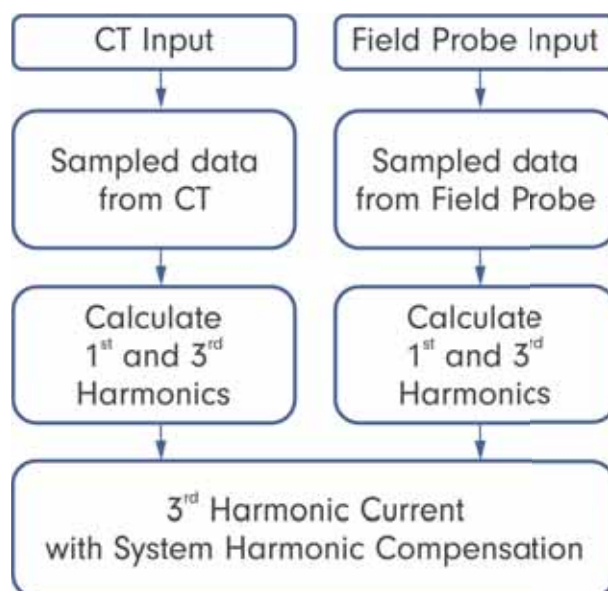


Method 1: Third Harmonic Resistive Leakage Current Measurement with System Harmonic Compensation (IEC 60099-5-B2)

When voltage is applied to the arrester, due to non-linear voltage current characteristics of metal-oxide used in arresters, harmonics are generated in the leakage current. 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.

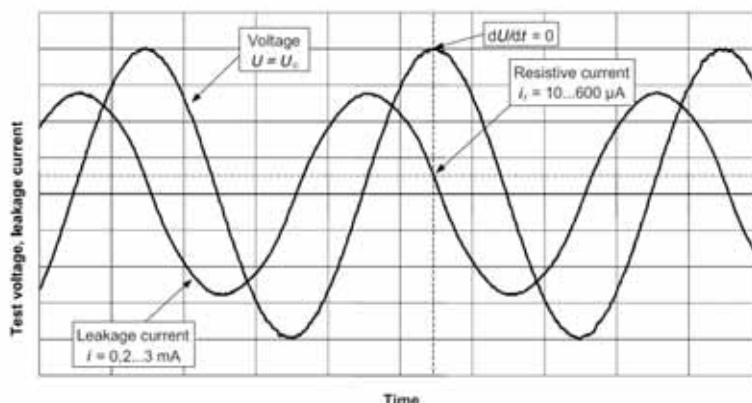
However system voltage itself may contain harmonics which will significantly influence the measurement of third harmonics in leakage current. Hence it is very important that the effect of these system harmonics is compensated to get correct results that reflect the healthiness of arrester.

SA 30i+ reads the total leakage current flowing through the earth conductor of arrester through a specially designed wireless Clamp-on CT and calculates third order harmonic current from it. Also a special wireless 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 voltage applied 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 LAs and factory or lab test.



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 SA Data software. User can define different correction tables for different types of LAs and attach it to the LA ID. While testing respective LA, SA 30i+ will refer the programmed correction table depending on type of LA instead of default correction table.

Special Features

- The innovative design makes SA 30i+ simple, lightweight, portable, feature-rich.
- Measures Total Leakage Current, 3rd Harmonic Resistive Leakage Current with System Harmonic Compensation and Corrected Resistive Leakage Current.
- Facility for selection of System Frequency (50Hz/60Hz)
- Safe Online measurement due to wireless CT and wireless Field Probe
- 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 big, back-lit LCD having large font size; printed on in-built thermal printer and can be stored in the memory of the instrument.
- SA 30i+, CT unit and Field Probe unit are powered by easily available re-chargeable Lithium-ion batteries. It works for a day's testing needs on a single charge.
- SA 30i+ is a switchyard compatible instrument. Being on-line & battery powered instrument, it is 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 for testing of GIS and LAs available optionally



```
IR (TH) :      87 uA
IR Corr  :      62 uA
ITotal   :    2034 uA
STORE    PRINT  EXIT
```

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SA 30i+
SCOPE T&M PVT.LTD.
PUNE INDIA-411 026

LA TYPE : STANDARD
LA ID   : V63
SR.NO.  : V63
LOCATION  : INDONESIA
RAT.VOLT : 330 KV
SYS.VOLT : 400 KV
TEMP.   : 32 DEG.
DATE    : 03/10/15
TIME    : 11:17:02
IR (TH) : 87 uA
IR CORR : 62 uA
ITOTAL  : 2034 uA
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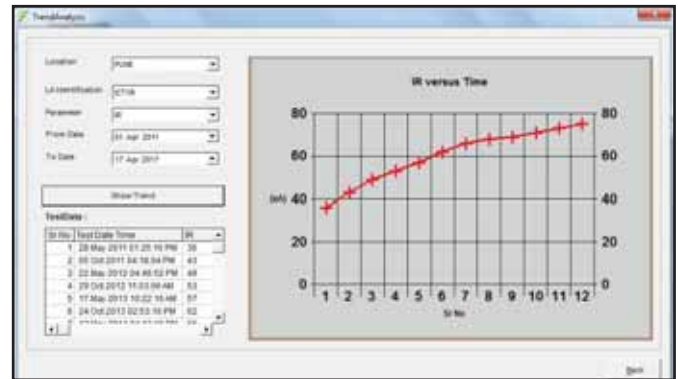
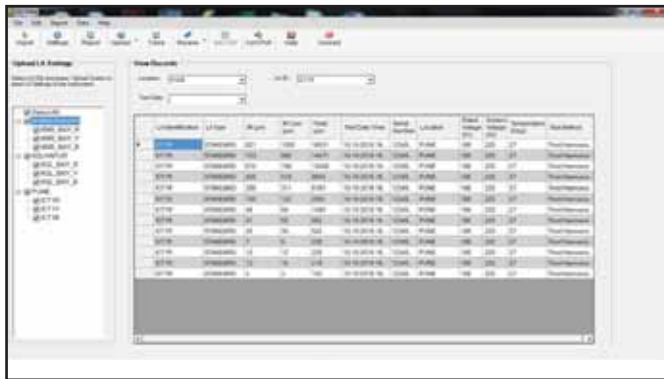
SA Data: PC Downloading & Analysis Software

SA Data is Windows™ based software. It enables users to create and store library of number of LA IDs along with relevant information pertaining to each LA like LA Identification, Type, Serial Number, Location, Rated Voltage etc. User can create this library off-field, upload it to the instrument via USB and use it on-field during testing, saving on-site testing time.

Results stored under such LA IDs in the instrument can be transferred back to SA Data, where they are stored in a structured & comprehensible format.

Trend Analysis for trending of historical data of a specific LA over specified period can be done to predict the healthiness of LA.

The report generation for the tests taken is also possible. This report can be exported to pdf and excel formats. It can also be printed.



Specification

Parameter	SA 30i+
Total Leakage Current Range	1 μ A to 20 mA
Resistive Leakage Current Range	1 μ A to 20 mA
Resolution	1 μ A
Accuracy	Value \pm 5% \pm 1 μ A
Inputs	Wireless Clamp on CT and Wireless Field Probe Optional External field PT Input (Voltage Peak Method as per IEC 60099-5-A1 for GIS)
Display	4 line x 20 character large backlit LCD with large front
Compensation	Automatic for System Harmonics, Temperature & System Voltage
Temperature Sensor	Inbuilt platinum resistance thermometer
Self-Calibration Check	Available
PC Connectivity	Through USB Port
Memory	Storage capacity of 2000 results
Printer	58mm Inbuilt Thermal Printer
Power	Battery as well as Mains powered Main Unit Battery powered CT and FP Units
Internal Battery	Main Unit - 11.1 V / 2200 mAh Rechargeable Battery, CT Unit - 11.1 V / 1150 mAh Rechargeable Battery, Field Probe Unit - 11.1 V / 1150 mAh Rechargeable Battery.
Mains Supply	88 to 264 VAC, 47 to 63 Hz, Single Phase
Battery Charger	Inbuilt in Main Unit, Connection to CT and Field Probe Provided
Dimensions	Main Unit - 340 x 295 x 155 mm, CT Unit - 340 x 73 x 40 mm, Field Probe Unit - 340 x 82 mm Cylindrical
Weight	Main Unit - 3.8 Kg, CT Unit - 0.7 Kg , Field Probe Unit - 0.75 Kg
Environment	-20°C to 55°C, up to 95% RH (non-condensing)

Certification

Parameter	SA 30i+
Environmental Tests	IEC 60068 / IS 9000 for Dry Heat, Damp Heat, Change of Temperature, Bump, Vibration and Mechanical Shock
Safety standards	Low Voltage Directive: 2014/35/EU Standard: EN 61010-1:2010 (3rd Ed.)
EMI/EMC standards	EMC Directive: 2014/30/EU Standard: EN61326-1:2013
Emission tests	AC Mains Conducted Emission, Radiated Emission
Immunity tests	Immunity to Electrostatic Discharge, Immunity to Electrical Fast Transients, Immunity to Surge, Voltage Dips and Short Interruptions, Power Frequency Magnetic Field, Conducted RF Susceptibility, Radiated Radio Frequency Electromagnetic Field

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
- Highly portable & easy to use
- Battery based operation enables measurement in absence of AC supply
- Reliability is proven in live EHV/UHV switchyard environment. **CE Marked.**
- Suits **equally to Utilities**, OEMs, Test Labs as well as Testing and Commissioning companies
- Strong expendable mounting arrangement (rods) for Field Probe.

Accessories

Standard	
Specially designed Wireless low noise, Clamp-on CT Unit	1 Set
Wireless Field Probe Unit housed in a light-weight case	1 No.
Extendable Mounting arrangement (FRP) in soft carry bag	1 No.
Thermal Paper Roll - 2 Nos.	1
SA Data PC Downloading & Analysis Software on CD	1 No.
Calibration Certificate having traceability to NABL	
Operational Manual	1 No.
Soft carry bag for main instrument & other accessories	1 Set
Optional	
External Field PT Input facility for measurement as per Voltage Peak Method IEC 60099-5-A1	1
Extra Large extendable mounting arrangement (FPU) suitable for 765kV LAs in soft carry bag	1 No.

Simple solutions for difficult measurements®

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