SCAR 10

Surge Arrester Testing

ALTANOVA GROUP

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GROUP
Advanced testing and monitoring solutions

Surge Arrester Testing

- On-line diagnostic of metal oxide surge arresters
- According to IEC 60099-5 A1 “Diagnostic indicators of metal-oxide surge arresters in service”
- Third harmonic analysis of leakage current with compensation
- Extensive field experience
- Easy, fast and reliable diagnostic method
- Safe lightweight equipment
- Highest quality, safety and reliability
- Worldwide high quality technical support in 100 countries

Application

SCAR 10 is used to check regularly the efficiency of the metal oxide surge arrester in service that are installed on the high voltage transmission and distribution networks.
SCAR 10 performs the test according to the IEC standard 60099-5 A1 ED. 1.0 Section 6: Diagnostic indicators of metal-oxide surge arresters in service - Method B1 and B2.

On-line leakage current measurement methods

SCAR 10 allows to carry out the control while the surge arrester is in service, analyzing by means of a special current clip-on transformer the leakage current in the surge arrester ground connection. The values of this current normally range from fractions of milliampere to a few milliampere, and are characterized by a third harmonic distortion whose value is an indicator of the deterioration of the surge arrester.
The resistive component of this leakage current may increase due to different stresses causing ageing and finally causing arrester failures.

Third harmonic with compensation

In case there is a doubt that the third harmonic comes from a heavy distortion of the voltage rather than the surge arrester itself, the auxiliary measuring probe provided with the SCAR 10 allows to measure this content quite easily in order to perform the compensation. This problem does not apply to HV arresters, as on HV lines the voltage distortion is almost negligible (typically 0.2%), while the limit for the arrester is 2% up. For MV arresters, the measurement of the third harmonic content in the voltage is easily performed connecting the instrument to the secondary of a P.T. of the line under test. The environment during the measure is characterized by the presence of high electric and magnetic fields. In order to minimize their effects on the measurement, the clip-on transformer is completely screened; also, the signal pre-amplifier is located on the transformer’s handle. Thanks to this arrangement, the cable connecting the clip-on transformer to the measuring instrument is less sensitive to the electric and magnetic field.

An auxiliary circuit generates a triangular waveform of which the following values are known: peak value, rms value, third harmonic component; this allows to check the calibration of the equipment.

SCAR 10 Specification

SCAR 10 comprises one measuring instruments and one special clip-on current transformer.

Measurement performed
- True rms of the total current
- Peak value of the total current
- True rms of the third harmonic
- Temperature

Display
- Liquid crystal display, with 3.5 digits
- Back lighted
- LED indicating the measurement range: µA or mA
- Low battery signaling on the display

Measurements

Ranges:
- Range of total current rms and peak measures: 1.999 mA, for currents less than 1 mA, or 19.99 mA for higher currents. Automatic range selection when the rms value of the total current exceeds 1 mA (nominal peak equal to 1.41 mA; maximum 1.999 mA)
- Third harmonic range: 199.9 µA for currents less than 0,1 mA, or 1999 µA for higher currents
- Automatic range selection

Filters

Response of the third harmonic filter:
- < - 60 dB at 50 Hz
- 0 dB at 150 Hz
- < - 20 dB at 250 Hz and higher frequencies

On request (60 Hz networks):
- < - 60 dB at 60 Hz
- 0 dB at 180 Hz
- < - 20 dB at 300 Hz and higher frequencies

Accuracy

50 Hz measure, rms and peak value: total maximum of ± 5% from 0.1 to 10 mA.
150 Hz rms measure: total maximum of ± 10% from 10 to 1000 µA.
On request (60Hz networks).
60 Hz measure, rms and peak value: total maximum of ± 5% from 0,1 to 10 m A.

180 Hz rms measure: total maximum of ± 10% from 10 to 1000 µA.

Insensivity to external fields

Electric field: < 10 kV/m.
Uniform magnetic field: < 50 µT.
Non uniform magnetic field, created by the circulation of a 20 A current in a conductor placed at 50 mm from the current clip-on transformer; the indication of the instrument will be 1 mA rms maximum, at 50 (60) Hz.

Calibration output

Calibration test output: SCAR 10 generates a triangular waveform current output of 1 mA peak at 50 (60) Hz, that flows on a short-circuit wire supplied, for calibration test pourpose. RMS value of the test current: 0.606 mA ± 5%.

Effective value of the third harmonic component: 65 µA ± 5%.

Power supply

Power supply: by means of four AA alkaline penlight batteries.
Battery life: over 50 hours with 10% back lighting; 25 hours with continuous back lighting.
Nominal frequency: 50 Hz. On request: 60 Hz (factory set; to be specified at order).

C 47-IS current clip-on transformer

The C 47-IS clip-on transformer is specifically designed to measure leakage current losses in the presence of high electric and magnetic fields. In particular, the winding is distributed on all the magnetic circuit; an external armor plating further reduces the external influence.
Current ratio: 1000:1.
Ratio error from 0,1 mA to 10 mA: 5% ± 0,05 µA.
Load resistance: 47 Ohm.
Frequency response: less than - 0.5 dB from 50 Hz to 10000 Hz.
Tightening diameter: 54 mm.
Jaw opening: over 55 mm.

Connection: 2 m screened cable, ending with a bayonet connector.

Voltage measuring probe

Test probe for measuring the third harmonic of the system voltage, 2 m long, with banana plugs for the connection to the PT secondary and connector for the connection to the SCAR 10.
Nominal voltage: 100 V phase to phase (57.8 V phase to neutral).
Maximum voltage: 200 V phase to phase.
The cable incorporates a resistor divider made of two resistors, respectively 56.8 kOhm and 1 kOhm, so that the output to the SCAR 10 is 1 V when the input voltage is 57.8 V.

Weight and dimensions

Measuring instruments:
- The measuring instrument is placed in a neck strap protection bag shockproof
- Instrument container: for hand-carrying
- Weight of the instrument alone: 0.75 kg
- Dimensions: 200 x 112 x 65 mm

Clamp-on current transformer:
- Weight: 0,9 kg
- Dimensions: 123(W) x 240(H) x 28(D) mm

Carry case:
- A plastic carry case holds: the clip-on transformer, the measuring instrument, the instruction manual, the short-circuit cable
- Carry Case dimensions: 450 x 320 x 110 mm
- Weight with all the components: 3 kg

Accessories supplied with the unit

- Instruction manual
- Measuring probe for the third harmonic of the system voltage
- Short-circuit cable to carry out the calibration test
- Plastic carry case

Applicable Standards

Electromagnetic compatibility
Directive 2004/108/EC. Applicable Standard : EN61326:2006.

Low voltage:
Directive 2006/95/EC (CE conform). Applicable standard, for a class I instrument, pollution degree 2, installation category II: CEI EN 61010-1.
Operating temperature: 0 - 50°C;
Storage: -25°C to 70°C.
Relative humidity : 10 - 80%, not condensing.
The unit can work without damages or safety issues above 2000m and at -15°C, but the accuracy might derate above 2000m and below 0°C.

Ordering Information

CODE	MODULE
11142	SCAR 10

ALTANOVA is a leading company in the field of condition based monitoring and diagnostics of electrical apparatus. ALTANOVA has its roots in two strong and long experienced companies well set in the market of testing and monitoring: ISA and TECHIMP. The merger of the two companies provides synergies for the benefit of our customers in terms of giving access to new solutions and technologies.

ALTANOVA serves customers in more than 100 countries and operates with local offices in Germany, US, India, Singapore, Brazil and U.A.E.

We provide solutions covering a wide spectrum of industrial segments such as, transmission and distribution, oil & gas, process industries, EPCs, power generation, renewables, marine and transport and OEMs.

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